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EQUIPMENT AND CAPACITY OF THE DOCKYARDS AND SHIPBUILDING PLANTS OF JAPAN

VOL. II: No. 9. MANILA, SHANGHAI AND YOKOHAMA, FEBRUARY, 1906 25 cents, U. S. Cy. 50 " Philippine Cy.

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ENGINEERING, COMMERCE, FINANCE.

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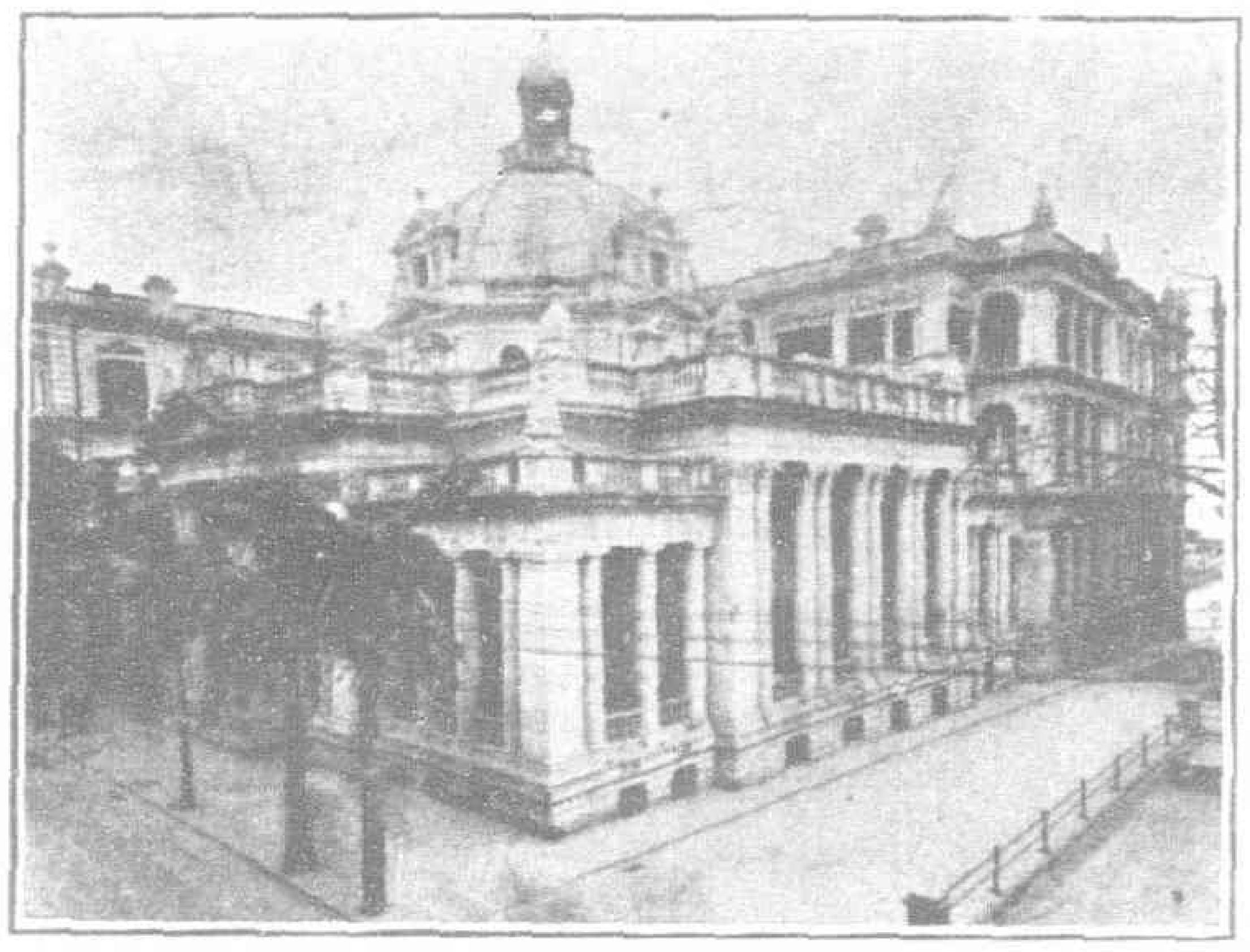

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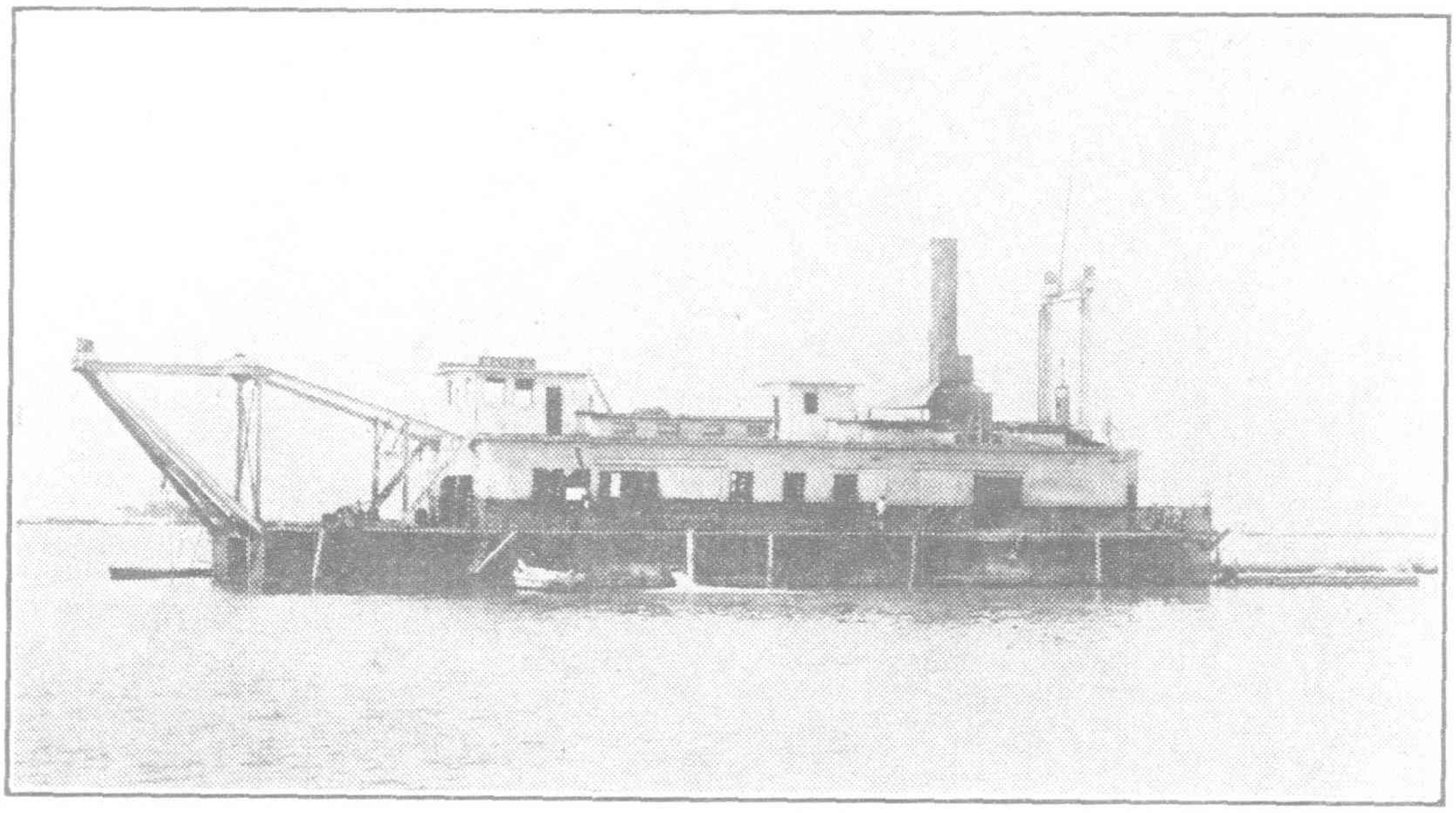

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THE FAR EASTERN REVIEW

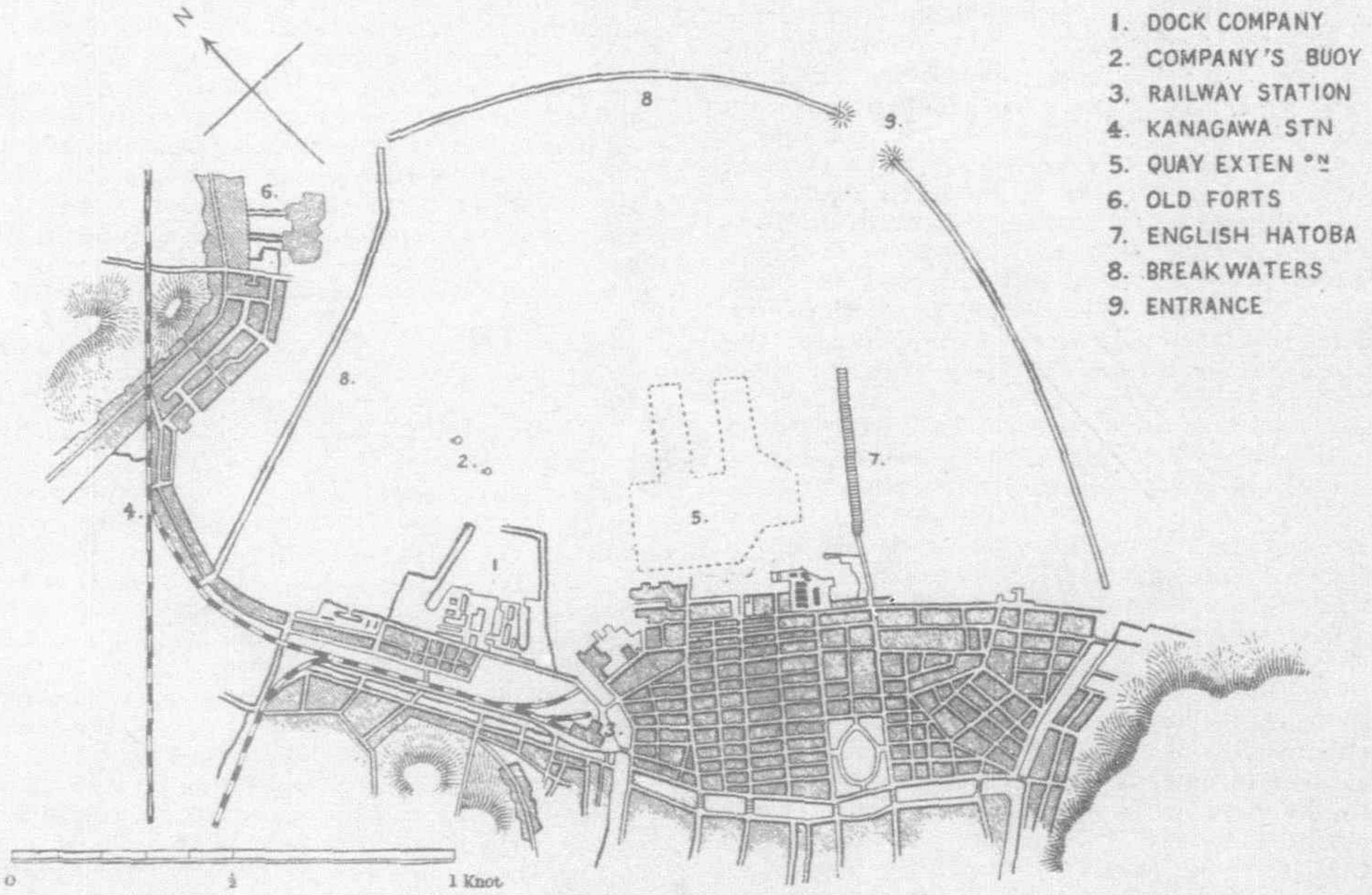
COMMERCE ◈ ENGINEERING ◈ FINANCE

VOL. II. MANILA, P. I., SHANGHAI, AND YOKOHAMA, FEBRUARY, 1906. No. 9.

Equipment and Capacity of the Dockyards and Shipbuilding Plants of Japan—I

(By CHAS. ALBERTSON.)

The Japanese are quartered on a long, narrow, very mountainous group of islands having an area ⅓ larger than the British Isles and about equal to that of California, of which only 12 per cent is capable of cultivation. The dense population of from 45,000,000 to 50,000,000, all dependent upon the products of the field and the nearby waters, carry on their outdoor work by many an ancient method. Their struggle for existence has not been an easy one. Yet with all this they are contented and happy, for the struggle has not been characterized by the haste and intense strain under which Americans labor. In this respect they are wiser in their day and generation than the Americans are.



YOKOHAMA HARBOR

PROGRESS OF JAPAN.—When considering Japan's progress it is well to remember that there are at least two view-points. One is the Japanese; and if we judge by their notions, the advancement during the time occupied by the last half of Marquis Ito's public life alone is little less than marvelous. This is the point of view persistently put forward by them and often seen in the newspapers. On the other hand, from the outlook of a foreigner who has lived in Japan and knows the average as well as the exceptional conditions, they still have a long way to go in their industries and civilization to attain the eminence they are popularly given credit of having already reached.

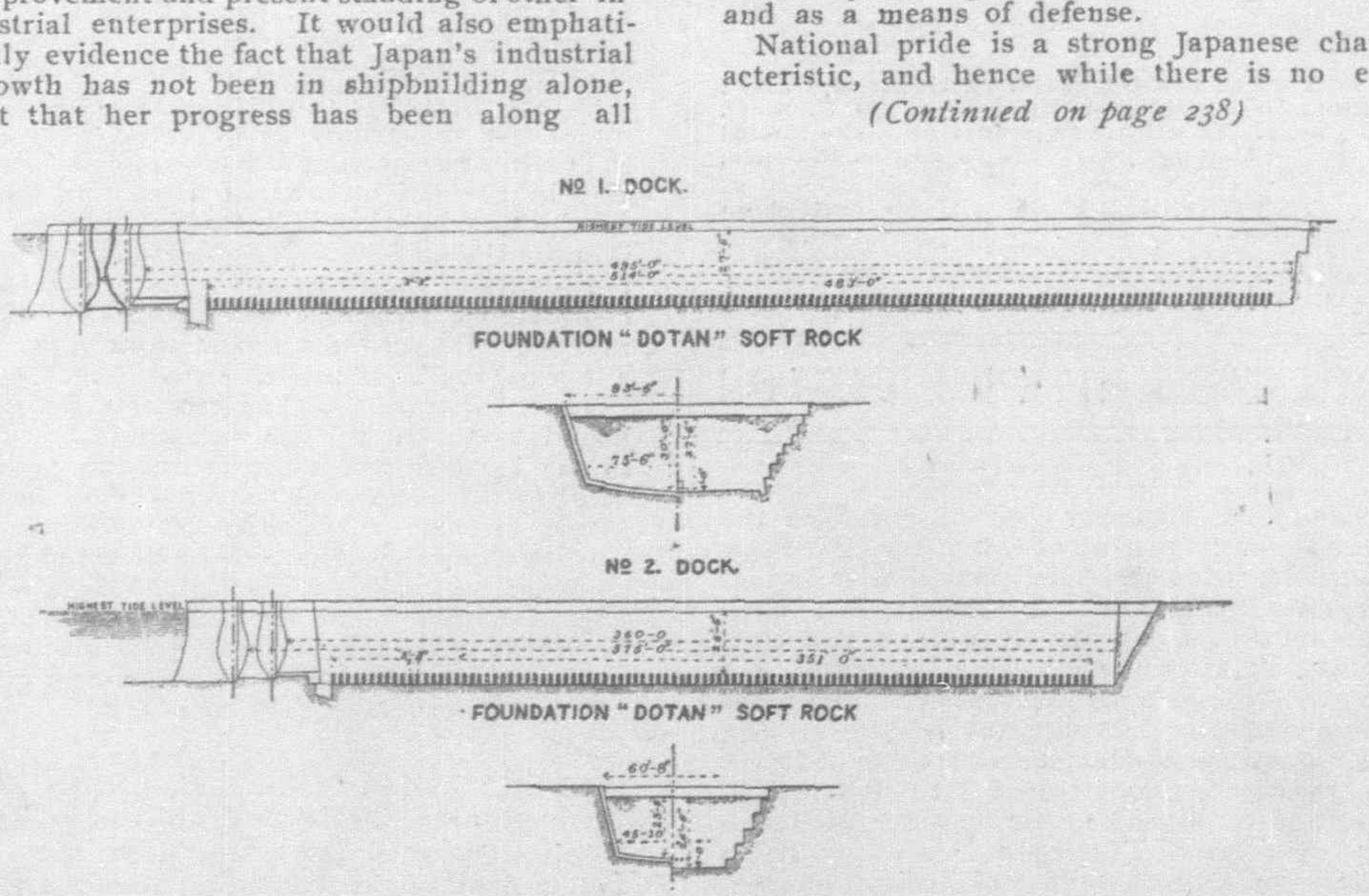
Japan progresses. Her shipbuilding progresses also. So do her other industries. Were it possible, a hasty glance along a few other lines of Japanese industry would be of interest as showing in a general way the past and existing conditions and the present state of progress. This comparison of industrial works should give the relative progress and position of shipbuilding as compared with the improvement and present standing of other industrial enterprises. It would also emphatically evidence the fact that Japan's industrial growth has not been in shipbuilding alone, but that her progress has been along all other lines, and therefore that shipbuilding has only been keeping pace with the national progress.

We may only state that in coal, copper, gold, and other mining she is using up-to-date appliances with good results. In the matter of electric street railways, her urban and inter-urban systems are well equipped and well-paying. Her steam railroads have been improved and extended, and the rolling stock and shops are in good condition. The postal system is a credit to the nation. The telegraphs and telephones are efficiently conducted at rates about half of what the free people of the United States are paying. Cotton spinning and weaving mills are successfully run. Electric-light and power plants, operated some by steam and some by water, are starting up in all advantageous places. Gas plants are being built, and the large cities are already supplied with excellent waterworks. And so on through the whole line of enterprises there is progress and success.

ADVANCEMENT IN SHIPBUILDING.—Even yet, in the matter of competition, the shipbuilding capabilities of Japan are not large enough to be of intense interest or much concern to the mighty shipbuilding nations of the earth. However, since Japan is creating an interest in herself by rapidly forging to the front and properly taking her place in the family of nations, all that directly pertains to her growth and welfare must sooner or later interest the other nations. Moreover, because of her insular and isolated position, she herself is mightily interested in and later may be more dependent upon her shipbuilding interests, both industrial and as a means of defense.

National pride is a strong Japanese characteristic, and hence while there is no es-

(Continued on page 238)



PLAN SHOWING CONSTRUCTION OF YOKOHAMA DOCK COMPANY'S DOCKS

THE FAR ESATERN REVIEW

GEO. BRONSON REA, M. E.
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A MONTHLY REVIEW OF FAR EASTERN TRADE, FINANCE, AND ENGINEERING. DEDICATED TO THE INDUSTRIAL DEVELOPMENT AND ADVANCEMENT OF TRADE IN THE PHILIPPINES AND FAR EASTERN COUNTRIES.

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ASSOCIATE EDITOR

E. E. ELSER
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MANILA, SHANGHAI, AND YOKOHAMA, FEBRUARY 1906

ANNOUNCEMENT

Mr. J. F. Kennedy has retired from the business management of THE FAR EASTERN REVIEW, being succeeded temporarily in that capacity by Mr. E. E. Elser who, until the return of our Mr. Rea from America, will look after the business affairs of the paper. Mr. Kennedy leaves our Manila office after rendering efficient and faithful service, and goes to Yokohama where he will act as Japan representative of THE REVIEW in addition to his future occupation as lessee and manager of *The Japan Advertiser*, which paper he secured control of during a recent business trip to the North. While we regret the retirement of Mr Kennedy from the publication office of THE REVIEW, we are gratified that he will remain with us as our Japan representative knowing that he will serve the paper well in that field. Mr. Kennedy's office will be located at 74 C, Yokohama, where he may be found after March 1st.

ENGINEERING REPAIR WORK IN MANILA

One of the first steps of importance taken by Major-General Leonard A. Wood, U. S. Army, after he assumed command of the Philippines Division, was in the interest of the engineering firms of Manila. He issued an order that after the repair work now under way at the Quartermaster Shops is cleaned up, so much of the plant as has been doing the work that otherwise could have been done by local engineering firms, under contract, shall be closed and this patronage distributed among the latter to the best advantage of the government. This action on the part of the general indicates that his policy as commanding general of the division will be to throw all the business possible resulting from the maintenance of the military establishment in the Philippines—other conditions being equal—to the business concerns of Manila. This broad spirit of administration is only a continuation of the policy General Wood has been carrying out in the Moro Province, where his works have long ago borne the fruits of cooperation on the part of the business community and general prosperity for the people. Since General Wood assumed military and civil control of the Moro Province he has brought all interests around to feel that they are a spoke in the wheel of government and that without unanimity of purpose the province can not prosper. The result is that today the people of the Moro country all feel that they have a personal claim on the government and that they are an important unit in the industrial and commercial development of the province, and in the affairs of the government. The cultivation of this obligation of the people to the public service has been the crowning feature of General Wood's brilliant administration of "The Chosen Land of the Orient."

We believe that by the closing of the shops General Wood has taken a wise and far-sighted step. Aside from a large saving which it promises to the government, the general effect will be to restore confidence in the serious intentions of the federal government to do good when good can be done, in the business circles of Manila. We are certain that the engineering firms fully appreciate the concession General Wood has made and that they will unite in an effort to render to the military the best service at the lowest prices possible. This is what General Wood expects, and in making the experiment he is certain of the support of these concerns. The local firms are conducting their business under the disadvantages of greater expense than other engineering firms operate anywhere else in the Orient, and of a scale of wages for skilled labor that is just as high here as it is in the United States. To offset this, however, the plants of the firms are well-equipped and complete, a fact that will materially assist in keeping prices for repair work down to a normal basis of profit.

The closing of the Quartermaster Shops is bound to throw a large amount of business to the local firms and influence the government to patronize these concerns better in the future instead of bundling off all sorts of jobs, that could just as well be executed here, to other places. The result will be a large sum of money spent by the government as by rights it should be spent, thus placing it in circulation where it will do the most good for the government that spends it.

THE SHANGHAI DOCK AND ENGINEERING COMPANY, LTD.

China Coast papers bring to us the announcement of the reorganization of the well-known general engineering and shipbuilding business of Messrs. S. C. Farnham, Boyd & Co., Ltd., of Shanghai, under the name of The Shanghai Dock and Engineering Company, Ltd. The affairs of the old company are being wound up voluntarily.

Columns have been written about "internal dissensions" resulting from the management of Messrs. S. C. Farnham, Boyd & Co., and summed up it appears that the disagreements arose over the failure of the board of directors to accord to the shareholders the representation in the affairs of the company they were properly entitled to. The directors, with Mr. John Prentice as chairman and managing director, fully realized that this desire was reasonable and just, and they finally consented to meet the wishes of the shareholders, with the result as stated above. The Hongkong and Shanghai papers lay the blame of the trouble upon Mr. Twentyman, formerly the dominating spirit in the directory of Messrs. S. C. Farnham, Boyd & Co. With his retirement the atmosphere immediately cleared, and what had been a chaotic state of affairs was transformed into unity of purpose and brought about a friendly understanding between the gentlemen remaining in control and the shareholders.

The shareholders are to be congratulated upon their decision to retain Mr. Prentice as chairman of the directory and managing director of the business; also the retention of Messrs. H. von Rücker and S. Groundwater, senior members of the old directory, as members of the new board. The personnel of the new board comprises the names of gentlemen who have long been leaders in large business enterprises, and there can be no doubt but that this splendid industrial enterprise will prosper and grow under their able supervision.

JAPAN'S MARCH OF PROGRESS

Japan is striding forward again. She is fast taking her place among the maritime and industrial nations of the earth. She has known how best to build up her trade and her home production. In order to get capital to enter her gates she has just broken with one of her oldest traditions. She is allowing foreigners to buy and hold land, and she is permitting her own people to mortgage their real-estate holdings. It was not possible in the past for capital to enter Japan, for the first demand made by capital is security, and the best security on earth is the earth itself. The law permitting the Japanese to mortgage their real estate puts into their possession the possibilities of loans amounting to at least -Y-785,000,000. With such a sum mines may be opened, soil reclaimed and factories built and equipped. Mortgages may be placed now in mills, mines, railways, etc., thus materially augmenting the industrial and trading powers of the country. Everybody in the Far East is beginning to notice that Japan is growing less and less dependent upon foreign factories. She is manufacturing many goods that went into her formerly from Europe and America. Nor is this all. She has gone forward until she is able to export large quantities of goods similar to those formerly bought from others for her own children. She is gaining a strong hold on the Orient. Expressed in figures her progress is indicated by an advance from -Y-56,000,000 in 1900 to -Y-97,000,000 in 1904. We believe that if anybody is waiting for Japan to fail or fall in her efforts to augment her industrial power or to extend her trade, he will be disappointed.

TRADEMARKS IN CHINA

The question of trademarks and other protection in foreign countries is one of the highest importance to manufacturers of special lines of goods. It is especially important to those using the markets of China, where the people are strongly wedded to custom, and where limited knowledge of progressive methods of the outside world makes them suspicious of everything that is new, regardless of any merit that may be presented.

The Chinese law affords no protection to foreign *chops*, or trademarks, a condition that has frequently led to serious complications in the transaction of business. Trademarks of goods, popular on the China market, have been closely imitated, and a cheaper and inferior quality has been substituted and disposed of under a spurious mark. This has led to a concentrated effort on the part of foreign government representatives in China to have the Chinese Government promulgate regulations which will minimize this abuse. Under present conditions the merchant in Shanghai representing foreign manufacturers files the trademark with his consular representative, and it is then transmitted to the custom-house, where it is recorded by number. The only advantage accruing to the business man under this arrangement is that in the event of trademark regulations going into effect he may claim priority and prevent a similar mark, subsequently filed, from being used in China. This is the only object of the transaction, for the Chinese Government at present expressly disclaims any legal protection whatsoever to the foreigner against a counterfeit of his particular trademark. Should such a law go into effect the Chinese Government could only aid a foreign merchant to the extent of preventing native dealers from selling goods masquerading under a counterfeit trademark. If the *chop* of a foreign manufacturer should be imitated by any other foreigner (and these instances have not been uncommon in China), his only remedy lies in prosecution through his consular representative.

The Peking Government, in 1904, formulated and submitted to representatives of foreign governments provisional regulations governing the registration of trademarks. They were to become effective October 23d, 1904. The provisions were unsatisfactory, however, and the American, British, and German associations of Shanghai submitted amendments which were forwarded to the ministers at Peking. They in turn amended the amended draft and submitted it to the Chinese Foreign Office, which referred it to the Chinese Board of Commerce, which now has it under consideration. While the foreign merchants are thankful that this highly important question is now before the official determining body, they do not anticipate relief in the near future, and are adopting universally the unsatisfactory but only means of protection afforded, through the filing of trademarks for record with the Chinese customs officials.

RECENT OFFICIAL PROMOTIONS

Great merit has been rewarded in the elevation of His Excellency Henry C. Ide to the office of Governor-General of the Philippine Islands, *vice* the Hon. Luke E. Wright, appointed by President Roosevelt first American ambassador to the Government of Japan. While we consider the retirement of Governor-General Wright a distinct loss to American interests in the Philippines, we are able to find abundant consolation in the fact that for a period——which we hope will be longer than it promises to be at the present time——the reins of government will be held by Judge Ide. The new governor-general is a tried and true official. He has been a moving spirit in official life here ever since the Taft commission took over the civil government, and as Secretary of Finance and Justice he has surmounted probably the most difficult economic problems that have arisen since American occupation. It is needless for us to dwell upon the record of this estimable gentleman, because it is so well known and has been given such wide publicity that it would have little effect here. Suffice it to say that Governor-General Ide is an ideal official, possesses all the qualifications required for a safe and sane administration of our insular affairs in the Philippines, and that he will prove a very popular governor-general with not only the American colony, but with the foreign residents as well. Commissioner James F. Smith, Secretary of Education, has succeeded to the position of vice governor-general vacated by the promotion of Judge Ide. He, too, is a veteran in the public service of the Philippines, and a conscientious servant of the people. We are gratified to note that, with the retirement of Governor-General Ide, General Smith will be elevated to the highest civil office of the Islands.

RAILROAD CONSTRUCTION IN THE PHILIPPINES

The long-hoped-for era of railroad construction is about to begin in the Philippine Islands. Complying with directions from the Secretary of War at Washington, the Philippine Commission has awarded to the contracting and engineering firm of Messrs. J. G. White & Co., Inc., of New York City and Manila, concessionary grants for the construction, maintenance and operation of the projected railroad systems on the Islands of Panay, Negros, and Cebu.

Following the formal award of the contract, Mr. H. A. Belden, general manager for Messrs. J. G. White & Co., in the Philippines, received instructions from his home office to proceed immediately with the survey of the islands in question, with the result that he will soon have field parties of civil engineers at this work. On Panay 100 ms. of line will be constructed, on Negros 100 ms., and on Cebu 95 ms. The terminals, routes, and branch lines can not be definitely indicated until the completion of the surveys, although it is understood that Iloilo will be headquarters of construction on the Island of Panay, and the town of Cebu on the Island of Cebu.

Late information from New York City throws some additional light on the interests behind Messrs. J. G. White & Co. in this big undertaking. Messrs. Kean, Van Cortlandt & Co., of New York City; Mr. Charles M. Swift, president of the Manila Electric Railroad and Light Company; Mr. Cornelius Vanderbilt, and Messrs. R. T. Wilson & Co., of New York City, and the International Banking Corporation, were associated with the grantee firm in the bidding, and will share the financial outlay for the construction of the lines. The combined capital of the syndicate amounts to many millions of dollars, so there will be no lack of funds to push the railroads to completion, equip them, and put them in operation.

There was no competition for the concessions in N. Luzon nor on the islands where Messrs. J. G. White & Co. are to operate. Messrs. Morris McMicken, G. Gresskens, G. Poncin, Jacob Furth, and E. C. Hughes, of Seattle, Wash., offered to build 100 ms. of line in S. Luzon, and complete the road in 3 yrs. instead of 1 yr., as required by the government, but when a second set of bids was called for this syndicate failed to respond. Messrs. Speyer & Co., bankers of 21 Pine st, New York City, and London, have offered to construct 425 ms. of line in Luzon without guarantee, in connection with the Manila and Dagupan system of the Manila Railway Company, Ltd., which they control. The bid of the Seattle contractors was for the proposed line in S. Luzon from Pasacao to Legaspi, with branches. This line was also included in the bid of Messrs. Speyer & Co., the former asking for a guarantee and the latter none. Messrs. Speyer & Co. want concessions to build branches of the existing Manila and Dagupan system, also; and it is said that if their bid is accepted it probably will result finally in the operation under one management of 633 ms. of railroad on Luzon. The firm's bid was for the line from Manila to Batangas and branches to Santa Cruz and to Lucena, the line from Dagupan to San Fernando and the line from Pasacao to Legaspi, with branches. There has been much speculation in Manila why the Secretary of War is holding back the government's decision on Messrs. Speyer & Co.'s bid. The Manila Railway Company, Ltd., has a large claim against the Washington Government for alleged damages to its lines, equipment and other property, during the Filipino insurrection, which is now being pressed with much vigor at Washington, and it is surmised in official circles here that on account of this the federal authorities intend to make searching inquiry into all features of the claim and its future influence over Messrs. Speyer & Co., before finally determining the question of letting them in on the new enterprises.

The invasion of Messrs. J. G. White & Co. into the railroad construction field of the Orient marks the first instance in the history of the United States where a strictly all-American syndicate has come into actual contact with railway construction problems of the Far East. For this reason the progress of building, which will be conducted along American lines, will be watched out here with great interest. Knowing as well as we do the ability of Messrs. J. G. White & Co. to handle large undertakings like this with ease and despatch, we have no hesitancy to predict that railway construction under their direction will develop many surprising features which other engineers of the Orient will be called upon by the dictates of their profession to study with interest. While the contractors hope to carry out the construction with native labor they will be prepared to draw upon Japan for workmen should the Filipinos fail to respond freely to the call for workmen.

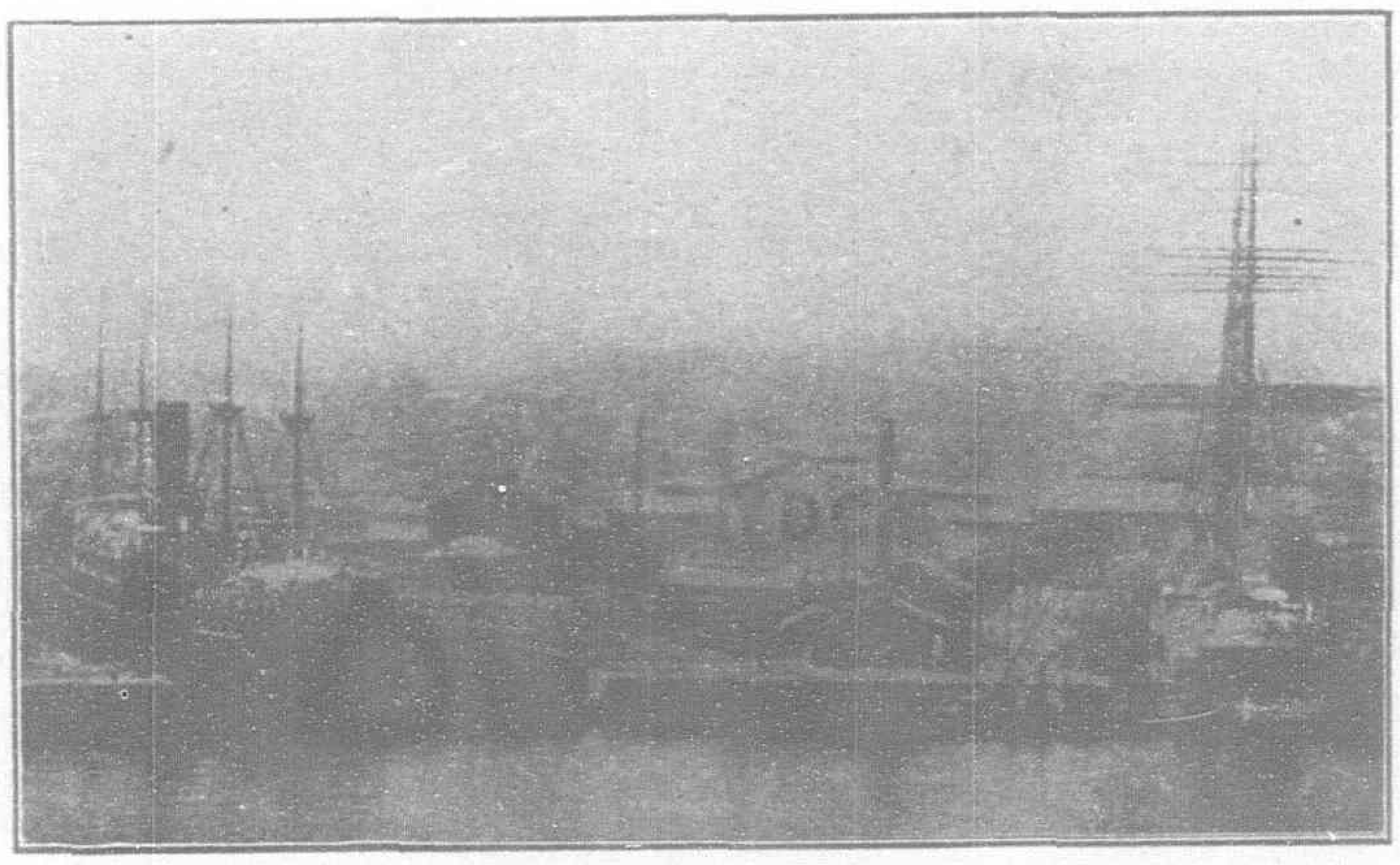
ELECTRIC URBAN FREIGHT SERVICE

Since the Philippine Commission has granted a franchise (or license) to the Manila Electric Railroad and Light Company to extend its system over certain streets in the city, for the purpose of hauling freight from the Trozo District station of the Manila and Dagupan Railway to the projected new harbor piers, it may be interesting to know that this kind of transportation is already in successful operation in Singapore. There freight trains are drawn by a *bogie* motor van which serves both as a baggage van and locomotive. The van is mounted on a Brill truck of the type described as *27 G*, and it is equipped with electric motors and controllers of the Dick-Kerr type, which were manufactured at Preston, England, by Messrs. Dick, Kerr & Co., who were the contractors for the entire equipment of the Singapore lines, consisting of 26½ ms. of track. The motors are of the 4-pole type, and are suspended on bearings 4″ in diameter. They are designed to work at a pressure of 500 volts, and are capable of giving 25 b. h. p. at 570 r. p. m. for 1 hr. without raise in temperature above 110° Fahr. The motor van, besides the baggage compartment, has a platform at each end, provided as a canopy as a protection for the motormen.

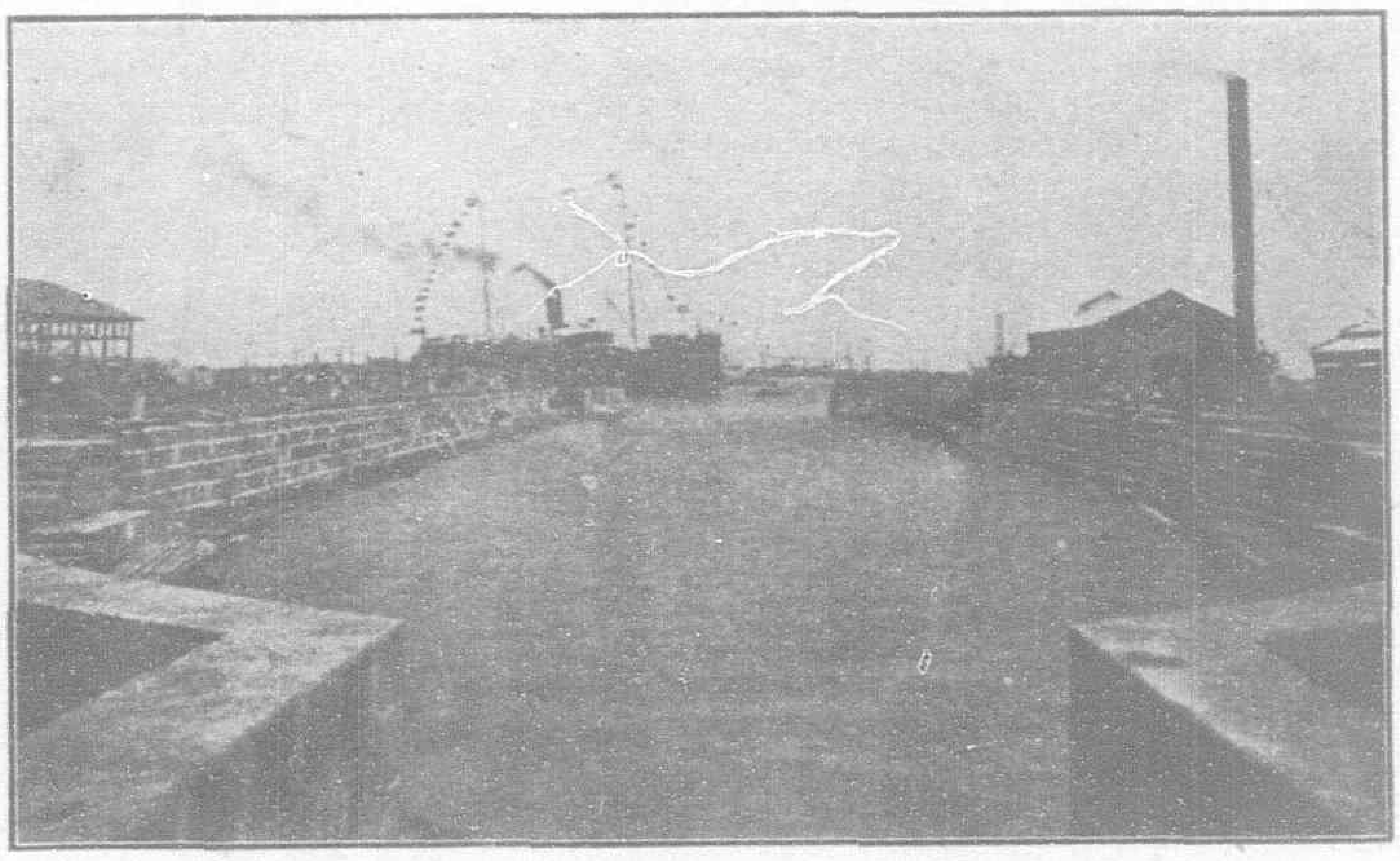
There are fifteen freight cars, 12′ 6″ in length, and 6′ 6″ wide. These cars are intended for loads up to 6 tons. The frame is made of mild steel channels, stayed by longitudinal stays, braces, and gusset plates. The sides of the cars are hinged, and can be let down for convenience in loading and unloading. In order to protect the freight from the weather each car is supplied with a detachable light angle frame, upon which a tarpaulin is spread for the entire length of the car, at a height of 7 ft. from the flooring.

Altogether the Singapore installation compares very favorably with any of the electric light railways in England and the engineers and contractors have provided some novelties.

An interesting feature in the construction of the Singapore lines was the use of the thermit joint, by which all rails were joined to make a continuous length. Considerable discussion took place on the initiation of the scheme as to the desirability of having continuous rails, it being thought by some that the variation in temperature would prejudicially affect the joints. Experience elsewhere appeared conclusive, however, and the thermit system was eventually adopted. The promoters of the undertaking are the Association General, Ltd., and the India Construction Syndicate, Ltd., of London, and the engineers were Messrs. Alfred Dickenson & Co., of Birmingham, who were engineers for the construction of similar lines in Barcelona, Madrid, and Capetown.



YOKOHAMA DOCK COMPANY, LTD.—GENERAL VIEW OF WORKS AND DOCKS

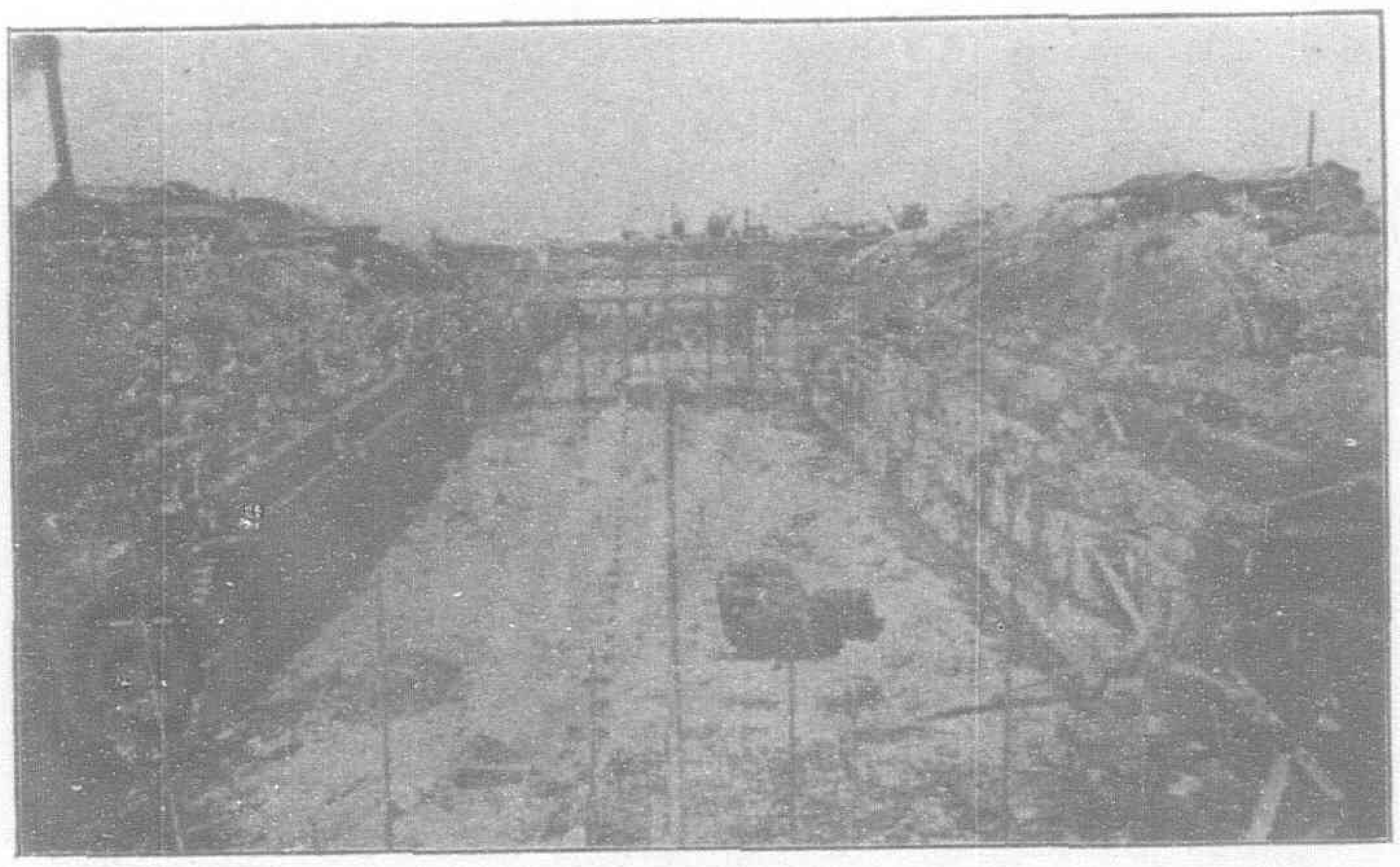


YOKOHAMA DOCK COMPANY, LTD.—VIEW OF FIRST SHIP, SAIKIO-MARU, ENTERING NO. 2 DOCK, 1897

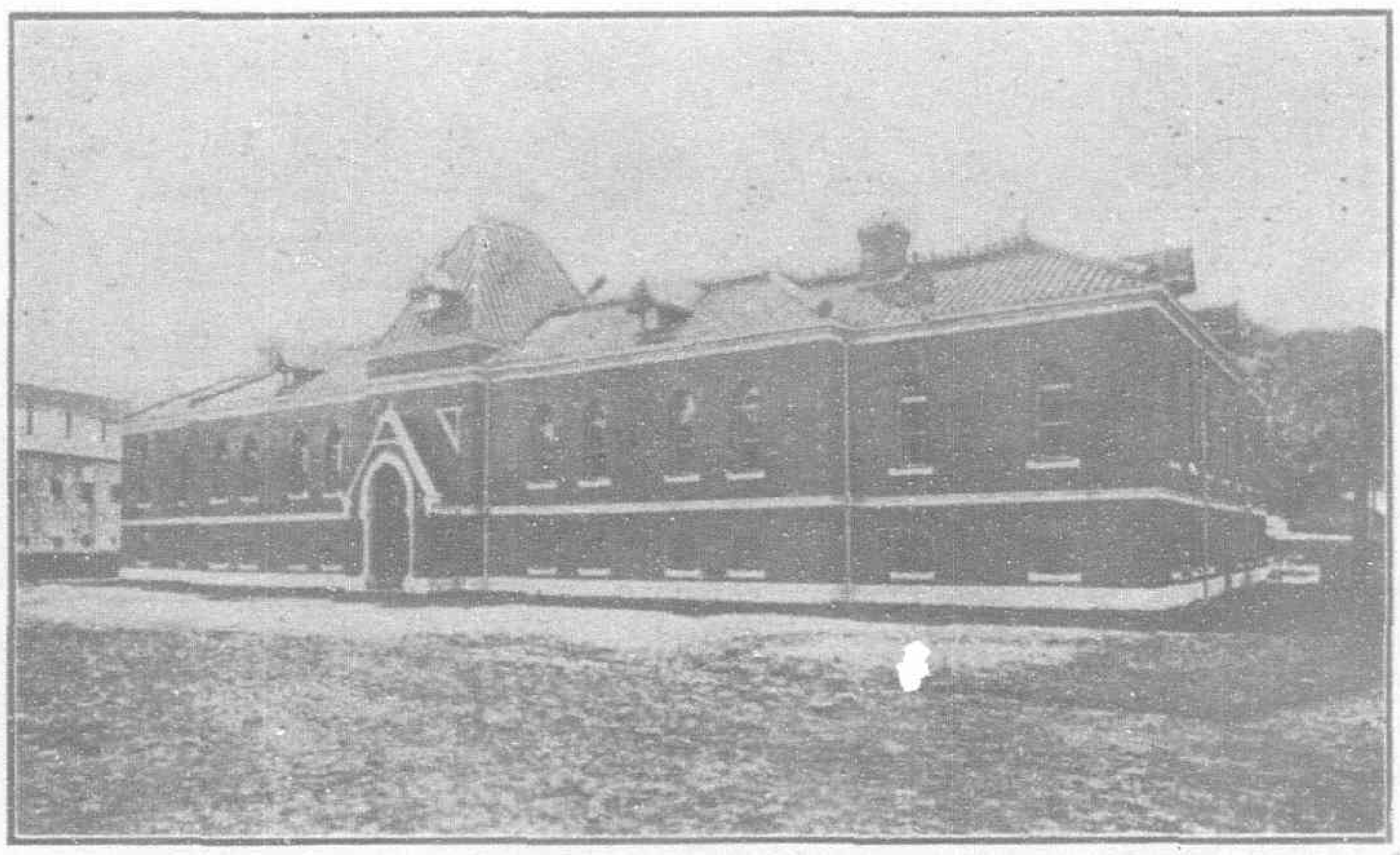
EQUIPMENT AND CAPACITY OF THE DOCKYARDS AND SHIPBUILDING PLANTS OF JAPAN

(Continued from page 235.)

pecial antagonism against the foreigner the Japanese earnestly desire to get all industries in their own hands and then be independent. This desire will be a long while in seeing its fulfillment, for we are none of us independent.



YOKOHAMA DOCK COMPANY, LTD.—VIEW OF LARGE DOCK IN COURSE OF CONSTRUCTION. TYPICAL JAPANESE DRYDOCK CONSTRUCTION



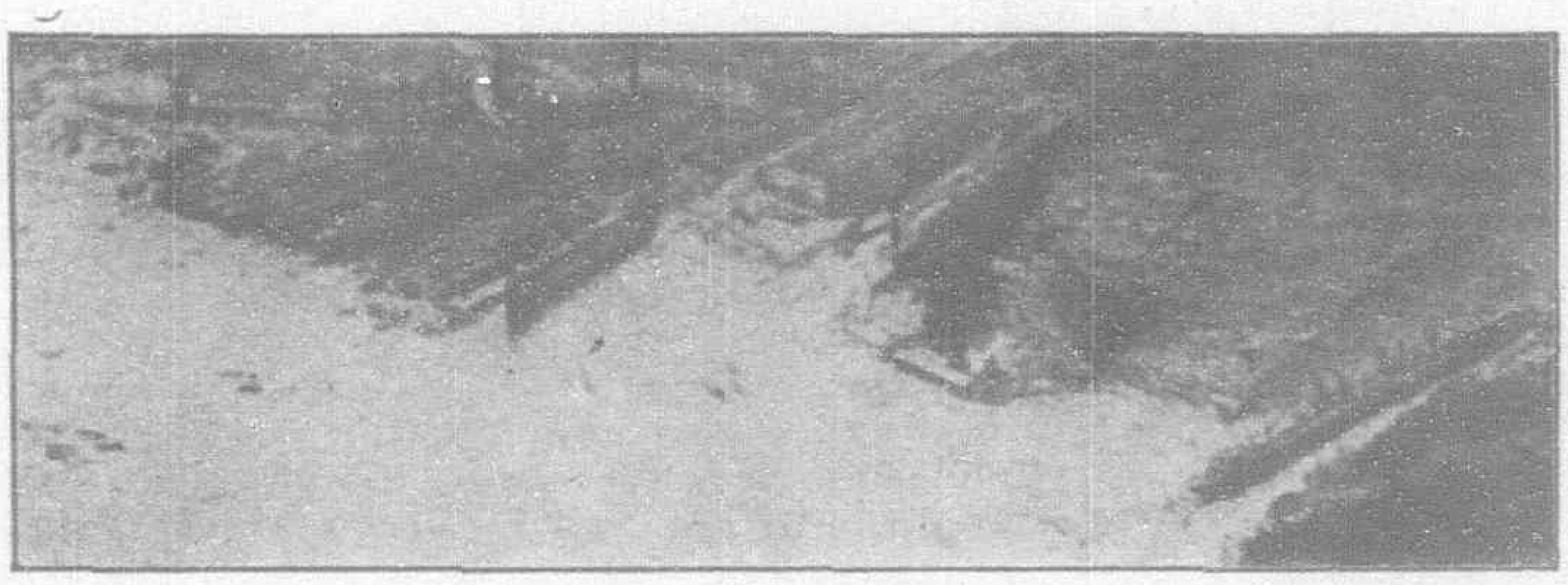
SCHOOL AT BITSU BISHI DOCKYARD AND ENGINE WORKS

Rear-Admiral Sasao, Director of the Naval Construction Corps, said in an address 2 yrs. ago:—"It is, perhaps, hardly necessary to point out how important it becomes to promote our industries connected with shipbuilding, in order that we may drive out foreign-made goods altogether from ships built in this country." A Japanese engineering journal voices the same sentiment.

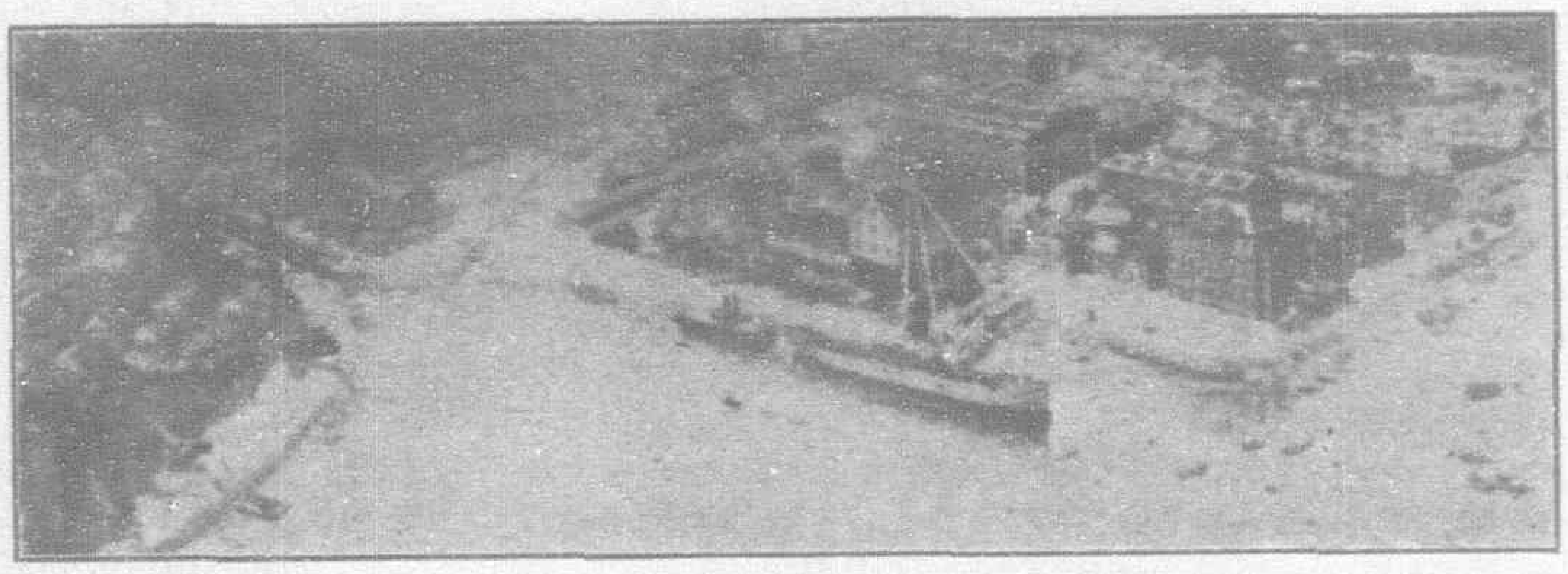
It is well to keep continually in mind the fact that the Japanese have done but little or nothing to add to the science of ship or engine building. Other nations have learned nothing new from her along these lines, yet this should not detract from the credit due to Japan on account of her splendid advancement. Her problem is the adaptation of the present knowledge of other peoples to her own use, and the training of men to use this knowledge for her benefit. This in itself is a large undertaking, but the results show strikingly how well it has been accomplished. She did not start with the old-fashioned paddle-wheel steamer and its primitive machinery, but leaped at once from the wooden junk to single and twin-screw steamers with compound and triple-expansion engines. She has been compelled to develop men rather than machinery. Even with the advantage of starting way up the ladder of science, she still has many, many rungs to climb in order to reach the height attained by other nations. That she is climbing, and climbing well, everyone admits.

It is a curious fact, worthy of note, that Japanese thought and language contain absolutely nothing in the way of words, or parts of words that could be pieced together, to express modern shipbuilding and marine terms. They have therefore borrowed outright most of the English technical terms, and use them, although at the Mitsu Bishi Works a few old Dutch words linger in use. Even on shipboard a Japanese captain gives his commands in English. All this helps to show how very new and strange shipbuilding and its component industries were to the Japanese.

Activity in a Japanese Shipyard.—If one could be dropped unawares into a modern Japanese shipyard, with eyes blindfolded and the peculiar sounds of the Japanese language kept from the ears, the sensation produced would be exactly similar to stepping into an English or American shipyard, for the clatter of pneumatic caulkers, riveters, and chippers, the rattle of plates, the grinding of punching and shearing machines, the thud and jar of steam hammers, the whir of motors, the crunch-



MITSU BISHI DOCKYARD AND ENGINE WORKS—HALF VIEW, COMPLETED IN OPPOSITE ILLUSTRATION



MITSU BISHI DOCKYARD AND ENGINE WORKS—COMPLETED FROM OPPOSITE ILLUSTRATION ing of hydraulic machines, and the rattle and rumble of hammers and machine tools generally, all conspire to give one the same feeling of progress and activity in the various departments that would be experienced in Great Britain and America. The appliances are the same, the result is the same; but the work is being done by a different nationality—one that is strictly Oriental, but nevertheless one that is versatile enough to take up the best that all nations have to offer.

About 300 yrs. ago, Japan was one of the most progressive, vigorous, and powerful of all the maritime and shipbuilding nations of the Far East. So apt were her seafaring people at designing and building the then great ships that she developed a fleet of fast 3-masted junks which out-sailed the ships of China, Korea, and all other eastern nations. This superiority in the matter of speed, besides building up a great sea trade, soon produced a class of pirates who plundered everything upon the high seas. Complaint after complaint reached the ruling *shogun* at Yedo. For this and other reasons an edict was finally issued forbidding the building of junks, having more than one mast. From that time even to the present day, many of these picturesque, though awkward, 100-ton junks sail the island-dotted waters of Japan. A later law giving full freedom to shipbuilding favors a type of foreign schooner rig, and soon the big, single square sail will be seen no more.

Under a wiser *régime*, Japan's summarily arrested development has taken on a new start and a new form, for today she builds in steel and sails with steam. It is no news that Japan is making a mark in the great world, and to shipbuilders and associated industries it will doubtless be of interest to know what may be expected of the *Little Sea Realm* in an industry upon which she is so dependent. England goes surely and steadily onward in the yearly construction of vast maritime fleets and great navies of peace-keepers. Germany has startled the marine world by her strides in the same direction, and lately the United States has surprised the globe with the work of her new and old shipyards, particularly as evidenced in the small but excellent home-built navy.

GENERAL SURVEY OF SHIPS AND SHIPPING.—It will be the purpose of this review to show exactly and accurately what Japan has been and is doing, and how well she is doing it; the difficulties under which she labors industrially, and her dependence on other countries for material. Then a reasonably correct forecast of the future may be made. A complete description of yards, their equipment, output, management, and labor conditions, together with a statement showing how the demand arises for repairs and ships, will therefore be pertinent and necessary to the subject.

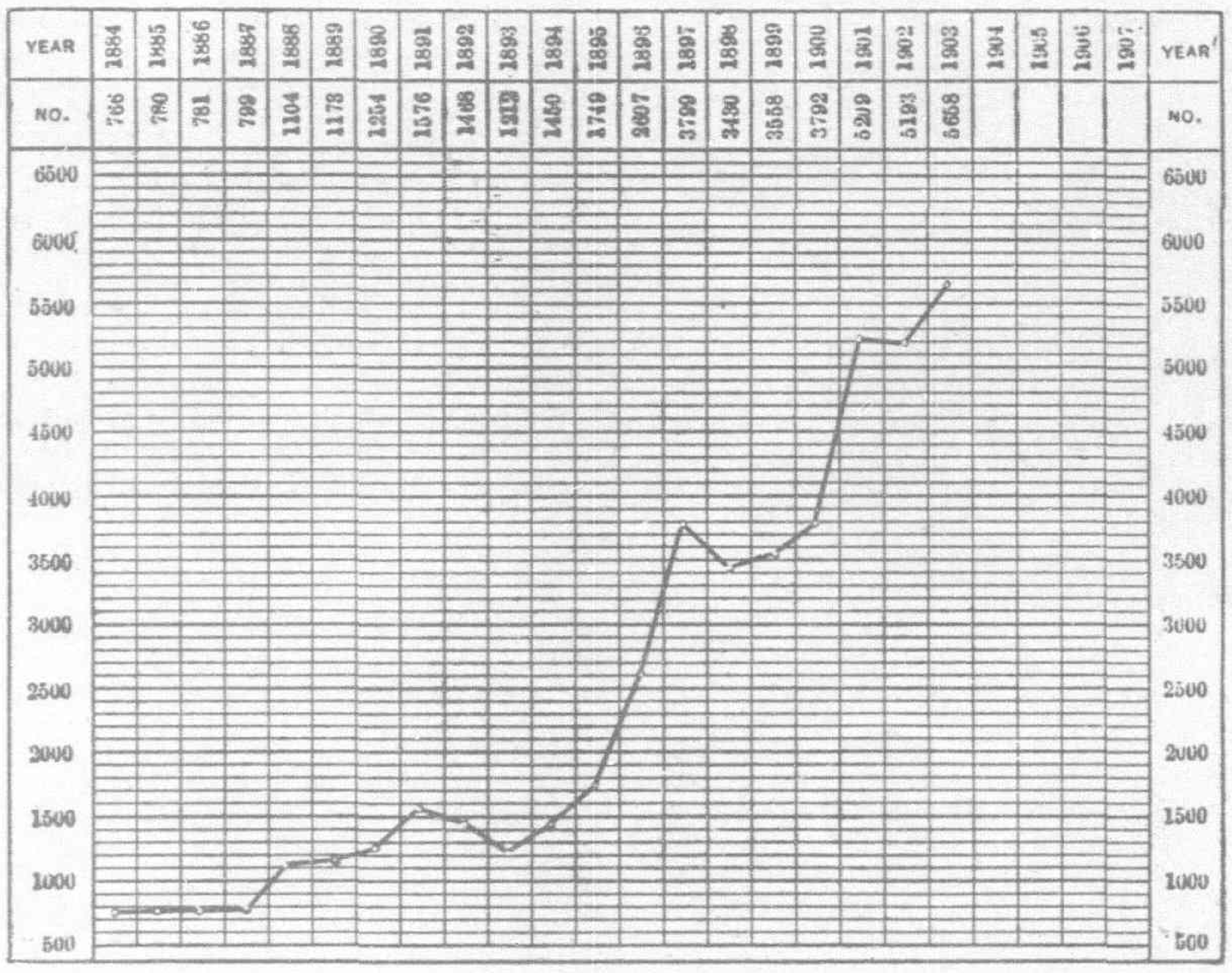


DIAGRAM ILLUSTRATING NUMBER OF WORKMEN EMPLOYED IN SHIPBUILDING 1884-1903 INCLUSIVE IN JAPAN

A general survey of Japan's ships and shipping shows that in 1870 the Japanese owned about 17,000 tons. Before the war with China there were under the Japanese flag a total of 225,000 gross tons. At this time the Japanese mercantile marine carried about 1/10 of the total exports of the empire. At the end of 1903, the number of vessels above 20 tons registered in Japan was 1,088 steamers, having a gross tonnage of 657,269, and 3,514 sailing vessels, mostly junks, with a gross tonnage of 322,154; or, in all, 4,602 vessels having a gross tonnage of 979,423. These figures include foreign-built as well as Japanese-built steamers, for in order to carry the Japanese flag they must belong to the Japanese.

In 1902, 23,000,000 tons of shipping entered and cleared at Japanese ports, of which more than 1/3 was under the Japanese flag.

For 10 yrs. ending 1903, the average tonnage of Japan's steamers increased from 180 to 650 tons. Since the shipbuilding subsidy act of 1896 there have been built in Japan about 40 steamers qualified to receive the subsidy benefits. These range in size from 713 tons to 6,444 tons, gross, making a total of, roughly, 100,000 tons, having a total of about 83,000 indicated h. p. The speeds vary from 10 to 15 ⅓ knots.

In 1893 Japan built 26 steamers totalling 4,000 gross tons and bought 10 steamers totalling 13,000 gross tons. In 1903 she built 65 steamers of 33,600 gross tons, and bought 17 steamers of 33,400 gross tons. It will thus be seen that during this period there has been a decided increase in both the number and tonnage of ships built at home, while the purchase of ships as compared with those home-built is gradually decreasing.

Shipbuilding materials are imported from England, America, and Germany principally. Contracts for delivering these articles at the

YOKOHAMA DOCK COMPANY, LTD.—BARQUE *ASTERISK* IN NO. 2 DOCK, 374 FT. LONG

SMALL JAPANESE SHIPYARD, BUILDING SAMPANS AND JUNKS. SITUATION TYPICAL OF MUCH OF THE COAST OF JAPAN

shipyards are awarded, after tender, to various Japanese and foreign importing firms who buy through their home offices. The Mitsu Bishi Company, however, purchases mostly through a representative in England who buys its supplies on a small commission.

With the exception of possibly some small lathes and other minor tools for use in the little yards, Japan still imports all her ship and engine-building, dockyard, and repairing equipment. It does not take long to state this, but it is worth some attention.

From pig iron to unfinished teak, from stempost to sternpost, at least 90 per cent of the material for building ships in the Japanese yards is imported. This is also worth some attention. Some of this, of course, arrives in the raw and is finished or made up at the yards; but many smaller items, such as deck machinery, pumps, fittings, etc., are imported complete. To order and deliver these supplies takes time, so that short delivery after placing a contract is impossible. All this, with labor cheap in price but not altogether efficient, show that Japan is not the best favored nation in the world in regard to shipbuilding. Builders and owners must therefore depend on the assistance of subsidies for a long time to come.

If she has a good supply of iron ore—which she has not—there would be then some hope of changing the present unfavorable conditions. One opportunity for improvement lies in increasing the efficiency of her labor without any undue increase in wages.

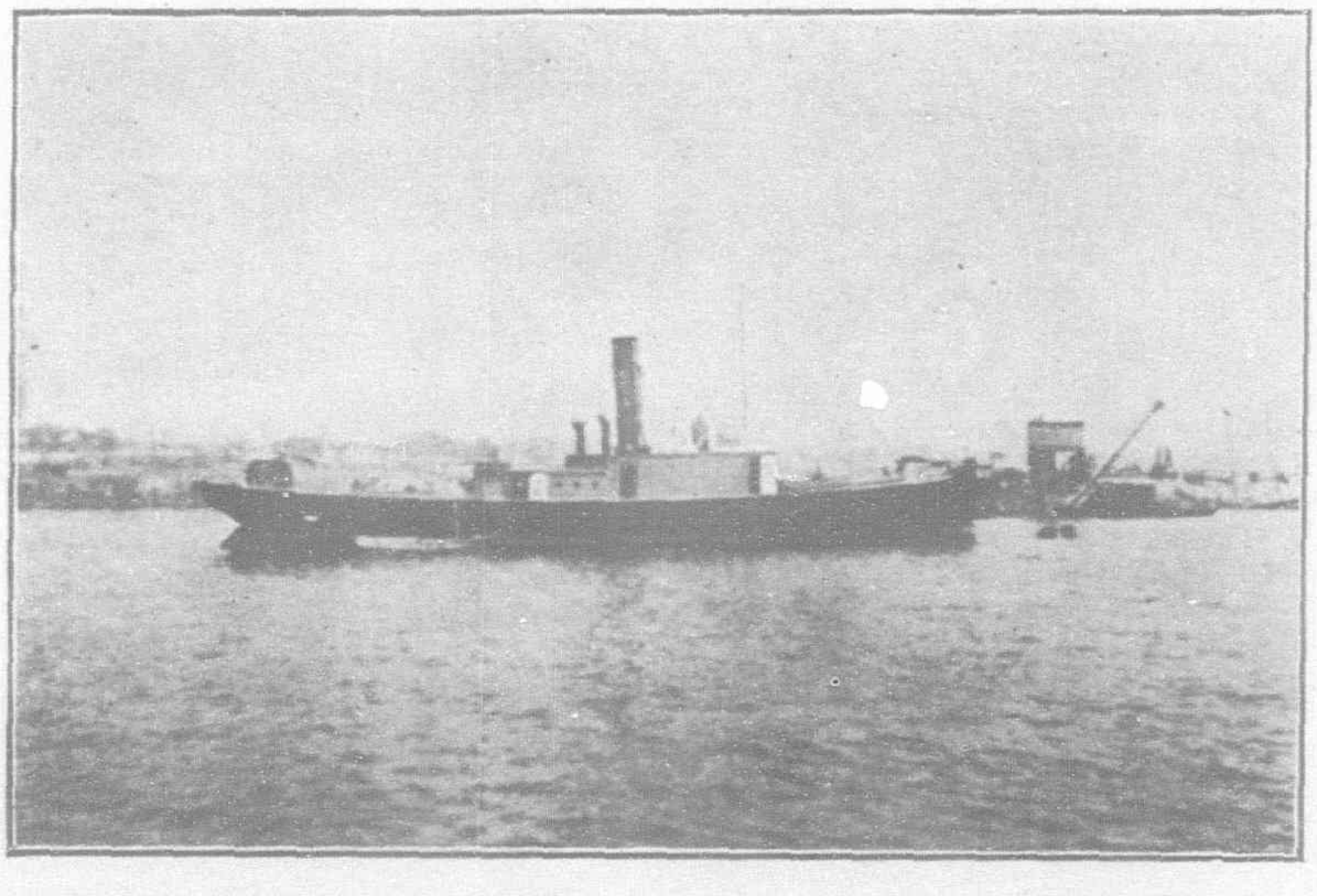
Longing for industrial independence, and also to meet the home demand for plates, shapes and rails, the government has established a steel plant at Yawatamachi, near the W. entrance to the Inland Sea, capable of turning out 80,000 tons per yr. The works import the nearest iron ore from China, and as Japanese coal is not "A-1" for coking purposes they can not be operated under the most favorable conditions. At the first the output was not satisfactory, and even today the builders prefer, for quality, an imported plate with Lloyd's test to one made in the only homeworks.

In 1893 there were in Japan about 60 shipbuilding yards. In 1903 this number had increased to 185. It must be borne in mind, however, that every place capable of building an ordinary junk is included in this number, and that the shipbuilding yards which are really of moment to the foreigner can be counted on the fingers of one hand.

Descriptions, some general and some in detail will be given of enough of the private shipbuilding and drydock establishments to show the general character of all of them. Those of most interest include the Mitsu Bishi Dockyard and Engine Works, Nagasaki; the Kawasaki Dockyard Company, Ltd., Kobé; the Yokohama Dock Company, Ltd., Yokohama; the Ishikawajima Shipbuilding and Engineering Company, Ltd., Tokyo and Uraga; Osaka Iron Works, Osaka; Hakodate Drydock Company, Hakodate, Hokkido; the Bingo Drydock Company, Province of Bingo, and the Innoshima Dockyard Company, Province of Bingo.

Other than the largest companies mentioned above, there are five which own docks more than 250' in length, and three owning docks more than 200' in length.

GOVERNMENT SHIP AND DOCKYARDS.—Of the imperial government naval dockyards only a few bare facts dare, with propriety, be given. These yards are four in number. One is at Yokosuko, nicely located inside the entrance of Tokyo Bay, and has three good drydocks. Here can be easily docked the largest battleship afloat. Among the warships constructed here may be mentioned the four largest, *viz., Hashidate,* an unarmored cruiser, 301'×51'×20', of 4,200 tons displacement, a designed h. p. of 5,300, and a speed of 16 knots, which was launched in 1891; *Akitsushima,* an unarmored cruiser, 300'×43'×17'6", of 3,000-tons displacement, a designed h. p. of 8,400, and a speed of 19 knots, was launched in 1892; *Nietaka,* a 3d-class unarmored cruiser, 335'×44'×76', of 3,366-tons displacement, a designed h. p. of 9,400, and a speed of 20 knots, was launched in 1902; *Otawa,* a 3d-class unarmored cruiser, 321'6"×41'3"×15'9", of 3,000-tons displacement, a designated h. p. of 10,000 and a speed of 21 knots, was launched in November, 1903.



YOKOHAMA DOCK COMPANY, LTD.—TWIN SCREW TUG *TOBE-MARU;* 100 FT. LONG, 300 I. H. P.

Leaving out torpedo-boats and torpedo-boat destroyers, these vessels constitute half the total tonnage of warships turned out in all Japan, and comprise ⅔ of Yokosuka's tonnage. They are also the largest ever built by the government in the island empire. This shows clearly how small a part of the Imperial Japanese Navy is built at home, since official records show that Japan has between 45 and 50 warships of over 1,000-tons displacement, approximating in all 250,000 tons.

Another of the naval yards is at Kure, hidden safely away among the islands on the N. shore of the Inland Sea. Here are two drydocks and here was docked the American battleship *Oregon* when the Russians claimed that the Port Arthur dock was too small.

In 1903 *Tsushima,* a 3d-class unarmored cruiser, 334'9"×44'×16' 3", of 3,400-tons displacement, a designed h.p. of 9,400, and a speed of 20 knots, was launched here. The recent exhibition in Osaka had on view a 10" gun made at Kure, as well as a full line of smaller arms and a very complete set of steel castings. These were the work of the arsenal department. Armor plate has not as yet been manufactured in Japan, but appropriations have been made for a complete armor-plate plant to be installed in the Kure yards.

Sasabo is another, though considerably smaller, naval yard, located at the end of a long, narrow bay on the SW. coast of Japan. Here there is one large drydock.

Maizuru is the newest of the yards, and is situated on the N. of Japan Sea side of the empire. Here, too, there is a splendid dock.

All of these yards are so located and fortified that it would be almost impossible for a foreign navy to get anywhere within range of them. The Japanese, to a greater or less degree, build torpedoboats and destroyers, o which they have added many to their navy

The preparedness and excellent condition of the Imperial Japanese Navy in its recent battles prove conclusively that these yards are well equipped and mighty efficient. A following article will give a comprehensive idea of the private shipbuilding plants, concerning the plans and equipment of which fuller details may be presented than is possible in the case of the government installations.

(To be continued.)

NAVAL COALING STATION, SUBIG, P. I.

The decision of the United States Government to maintain a naval station in the Far East has taken concrete form, and work will shortly be started by Messrs. J. G. White & Co. (Inc.), of New York City and Manila, who have been awarded a contract for the construction of a naval coaling station, complete, with equipment, at Olongapo on Subig Bay, P I.

The present installation will constitute one unit of six which will ultimately be built, providing a coal storage of 120,000 tons for the use of the United States Navy. The initial unit will cost approximately $500,000 gold, and will require 2 yrs. to complete.

Subig Bay, about 75 ms. N. of Manila, is one of the finest harbors in the Orient. It was originally intended to establish a naval base at Cavite, but the board of army and navy officers decided in favor of Subig Bay in preference to both Cavite and Guam. The harbor will be heavily fortified and it is estimated that it will require an expenditure of between $10,000,000 and $15,000,000 to carry out the work proposed. A large part of the bay will be dredged to a depth of 35′, this being sufficient for the largest battleship in the navy.

The coaling plant will consist of apparatus for unloading coal from vessels or cars, and storing same, together with means for reclaiming the coal from storage and delivering it to vessels or cars again. A large water-storage tank having a capacity of 50,000 galls. will be located on top of a nearby hill and a pumping plant provided, to supply it with water from the Benictigan River, about 1½ ms. from the station. This water will be used for fire purposes in connection with the coaling station, or for the use of vessels.

The coaling unit about to be installed will be built upon a wharf 250′ long and 75′ wide. This wharf will be set upon clusters of piles which will be inclosed in concrete, thus protecting them from the action of the torredo. The dock of the wharf is of steel and concrete. From the outer edge of the wharf a steel and concrete coal bunker will be erected, having a capacity of 5 tons of coal per running ft. It will be provided with chutes for delivering coal upon the deck of vessels or into cars. An electrically-operated movable coal-unloading tower, constructed of steel, will be operated on a track extending along the top of the coal bunker. It is designed to take coal from cars on the landward side of the wharf or from colliers on the seaward side, and delivering this coal either into the bunker or upon a conveyor which will carry it to the coal-storage building. The conveyors will have a capacity of from 100 to 150 tons of coal per hr. The coal storage shed will be a steel structure with a concrete floor 450′×150′, and will hold approximately 15,000 tons. The enclosure will be divided by concrete partition walls, so that the greatest amount of coal in one pocket will be 600 tons, thus preventing the spread of fire which is liable to occur spontaneously where large masses of bituminous coal are stored.

Electric thermostats will be located at 20′ intervals, and will ring an alarm in the office of the superintendent should the temperature of the coal rise above a fixed point. All of the conveyors and other apparatus for handling the coal will be electrically operated, and a power-house of ample capacity will be installed adjacent to the coal storage building.

This unit, as described, will be supplemented from time to time by other units of similar size and type, the wharves extending continuously along the bayfront. Each wharf will accommodate a battleship, which can be coaled, to the extent of 2,000 tons, in less than half a day.

All of the coal used will be brought from the Virginia coalfields in tramp steamers, *via* the Suez Canal. The cost is practically $8 gold per ton at Subig Bay, as against $5 for Japanese coal and $5.50 for Australian coal. The American coal is, however, of a considerable higher grade and better adapted for use under marine boilers.

In conjunction with the coal station, extensive marine and repair shops will be built, in which repairs of any kind can be carried out, and small cruisers and gunboats entirely reconstructed.

Large floating docks will also be built to accommodate the largest vessels in the American Navy.

MANILA'S FINANCES, FISCAL YEAR ENDED JUNE 30th, 1905

The annual report of the Municipal Board of the City of Manila, P. I., for the fiscal yr. ended June 30th, 1905, just made public, shows the financial status of the municipality during that period.

The effect of the Internal-Revenue Law on the finances of the city, anticipated in the previous annual report, was fully realized. This, taken in connection with the decrease in the amount collected for land taxes, on account of the fact that during the previous yr. collections were made covering 18 mos., caused a reduction in revenues of nearly 25 per cent, which was about equally divided between the effects of the Internal-Revenue Law and the decrease in land-tax collections.

This reduction in revenues caused an apparent deficit at the close of the fiscal yr. 1905 of ₱22,266.25, which, however, is more than covered by the refund to the general revenue due on account of the expenditures made from the general funds for the preliminary work on the new water and sewer systems, which totals ₱359,889.13, which, it is expected, will be refunded from the resources of the bond issue.

The revenues estimated in the previous annual report were not realized by about ₱400,000, due to overestimate of land tax ₱188,000, and the fact that payments expected were delinquent by ₱104,000; reductions in collections of certificates of registration, ₱20,000; matadero fees ₱5,000; licences, ₱60,000; municipal court fines, ₱65,000; vehicle tax ₱30,000; while the estimate was exceeded in the collection of market fees, ₱5,000; pail system, ₱32,000; industrial tax, ₱24,000; water system ₱11,000.

The total revenues from collections were ₱2,937,474.83 and the grand total of expenditures ₱5,129,490.76. Following is a statement of the condition of the city finances June 30th, 1905:—

Balance from fiscal yr. 1904		₱610,497.45
Total revenues collected fiscal yr. 1905		2,937,474.83
30 percent of city's expenses paid by insular government	₱1,530,102 23	
Expenses of collection of internal revenue from January 1st to June 30th Act No. 1189)	29,150.00	
Total paid by insular government		1,559,252.23
Total credits		5,107,224.51
Total expenditures during fiscal yr. 1905		5,129.490.76
Deficit June 30th, 1905		22,266.25

The total revenues for the yr. show a decrease of ₱967,658.59, or about 25 per cent less than for the previous yr., the decrease being due mainly to reduced land-tax collections and the effect of the Internal-Revenue Law. Other decreases in collections appear in the matadero fees, due to competition of Australian meats in the public markets, thus causing a reduction in the number of animals slaughtered in the matadero; a reduction in the municipal court fines, caused by the reduction in average fines imposed and the number of fines; a reduction in the vehicle taxes, caused by the abolition of the tax at the beginning of the yr. These reductions, however, are offset by the increase in market fees, due to increased number of markets; increase in the collection of the pail system and the cleaning of vaults, due to increased business done; increase in the water receipts on account of increased number of installations, and increased cemetery fees on account of the opening of Cementerio del Norte.

The actual revenue from taxation was ₱1,698,463 07, which, on a basis of population of 219,941, equals a *per capita* tax for municipal purposes of ₱7.72.

The total expenditures during the yr. were less than those of the previous yr. by ₱16,328.66. Of these expenditures ₱92,595.21 are applicable to the fiscal yr. 1904, leaving the actual expenses for the yr. ₱5,036,895.54, which may be segregated into current expenses amounting to ₱4,231,091.82 and nonrecurrent expenses amounting to ₱805,803.73. Of the current expenses ₱3,037,714.55, or about 71.8 per cent, were expended for salaries and wages, being an increase of the ratio of salaries and wages to total expenses over the yr. previous of about 2 per cent, due to the increased pay of members of the police and fire departments.

It is estimated that the revenues for the fiscal yr. 1906 will be ₱3,146,500. It was hoped that the expenditures might be so reduced under the heading of "Public Works" that the deficit at the close of the last fiscal yr. could be fully made up, but, owing to the large sums necessary for the reconstruction of the Pasig River wall (₱336,000) and the new Ayala Bridge (₱200,000), it was found impossible without a material reduction in the current expenses of the city. The ordinary current expenses recommended for the yr. are ₱4,042,570, a decrease of ₱188,521.82 from the current expenses of the last fiscal yr. In addition to all other expenses the city will be called upon to pay interest and sinking fund of ₱118,740 on the first issue of sewer and waterworks construction bonds. In this connection the board again invites attention to the recommendations in its previous annual report regarding the bond issue of ₱4,000,000 for permanent public improvements, which, if available during the next 4 yrs., would relieve the necessity of reducing the current expenses by relieving the general funds from large expenditures for public works.

The grand total of extraordinary expenses for the fiscal yr. 1906 is ₱1,039,830. Following is a statement of the prospective condition of the city's finances at the close of the current fiscal yr.:—

GENERAL FUNDS.

Estimate of revenues from collections		₱3,146,500.00
Refund of moneys expended account sewer and water-works construction		359,889.13
30 per cent expenses to be paid by insular government		1,592,102 00
Total credits		5,098,491.13

ESTIMATED EXPENDITURES.

Ordinary	₱4,042,570.00	
Extraordinary	1,298,570.00	
Deficit fiscal yr. 1905	22,266.25	
Total debits		5,363.406.25
Deficit July 1st, 1906		264,915.12

Total expenses, ₱5,341,140, of which ₱33,800, tax refunds, to be paid wholly by city.

WATER AND SEWER CONSTRUCTION BOND-ISSUE FUNDS.

Sale of $1,000,000, gold, bonds, at $1.095625, at two for one	₱2,191,250.00
Estimated interest on deposits	60,000.00
Total credits	2,251,250.00
Estimated expenditures	670,000.00
Balance July 1st, 1906	1,581,250.00

While the above statement shows a deficit, it is hoped by careful economy that this deficit may be considerably reduced before the end of the fiscal yr. This will be especially true if the assistance of the reorganization committee is obtained, which has been requested by the board in order to point out, if possible, economies that may be effected without detriment to the service.

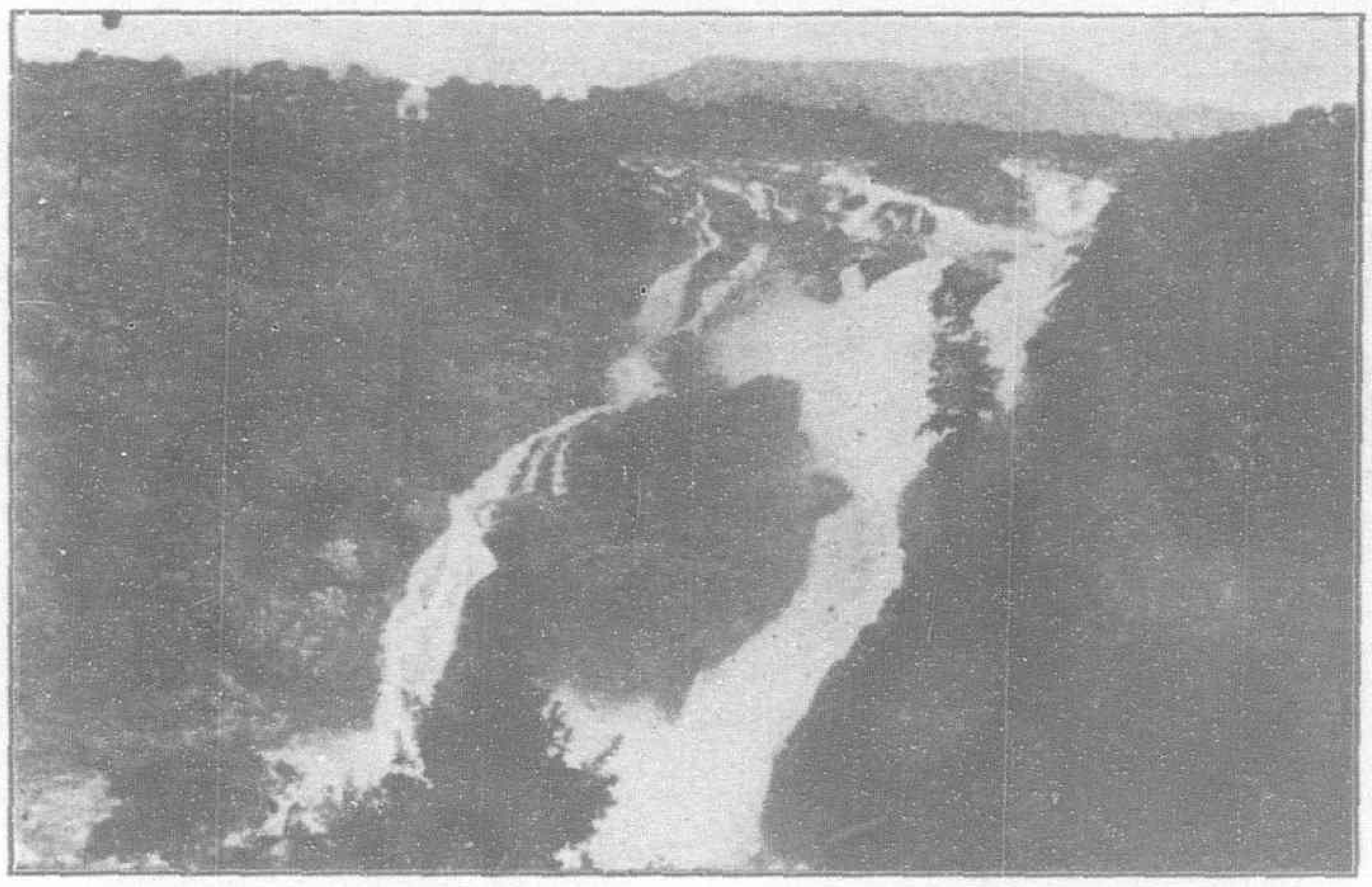
The city has for the first time since its organization under the Charter of Manila the following liabilities.

LIABILITIES

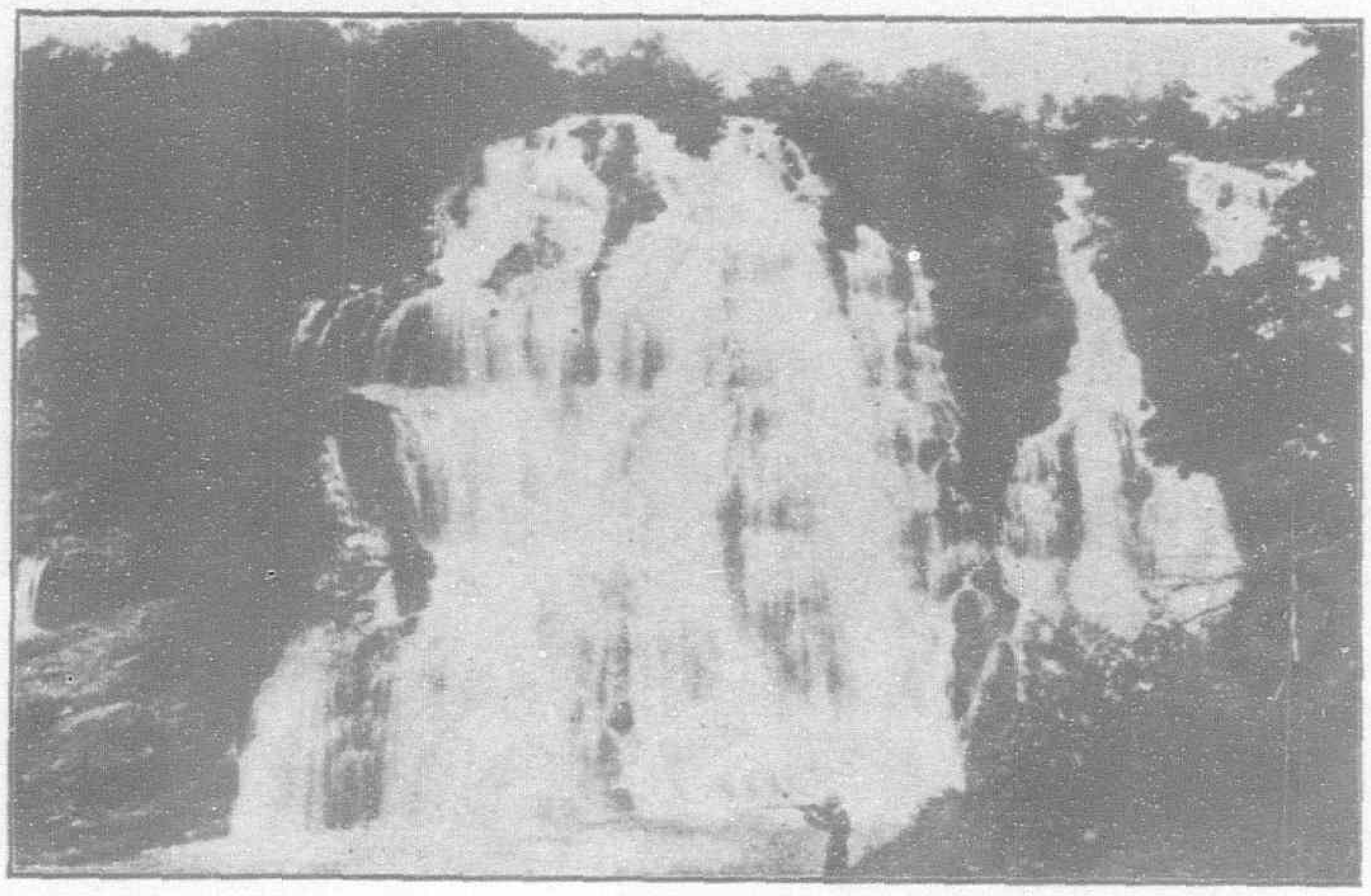
Water and sewer construction bonds, issued June 1st, 1905, 30 yrs. 4 per cent, Act No. 1323, Philippine Commission		₱2,000,000.00
Purchase of land transportation from insular government:		
Debit—		
April 1st, 1905, inventory of equipment and animals	₱120,000.00	
Supplies at 85 per cent of value and buildings at 85 per cent of cost	125,062.00	
		245,062.00
Credit—		
Amount received from bureaus of insular government for transportation furnished—		
April	₱6,702 40	
May	12,550.31	
June account (estimated)	8,300 00	
		27.552.71
Transportation liabilities		217,509.29
Total liabilities		2,217.509,29

The Largest Hydroelectric Installation in Southern Asia, Mysore Province, India—I

(By A. C. HOBBLE.)



GUNGAN CHUCKI FALLS, CAUVERY RIVER, NEAR SIVASAMUDRAM. HINDU TEMPLE AND SMALL VILLAGE ON THE LEFT



BURR CHUCKI FALLS, E. BRANCH OF THE CAUVERY RIVER, NEAR SIVASAMUDRAM

The first installed plant of the Cauvery power scheme, located in the Province of Mysore Southern India, has been in successful operation 3 yrs. In December of 1904 was completed the second installation, or extension, of 3,610 kws. Power is transmitted at a pressure of kws. generator capacity; thus increasing the possible output of the plant to 7,920 kws. Power is transmitted at a pressure of 35,000 volts over duplicate 3-phase lines, a distance of 92 ms., to the Kolar gold fields, where it is utilized almost entirely in mining operations.

The Cauvery River falls are located near the site of the old Hindu village of Sivasamudram. The Cauvery River is the dividing line between the Province of Mysore and the Presidency of Madras. At this point a fall of nearly 400' is afforded, giving an average calculated h. p. of approximately 12,000 during the dry season of the year and a maximum of over 200,000 h. p. at times during the monsoon or rainy season.

Work on the first installation of the plant was started near the end of the yr. 1900, and was completed after many difficulties in June, 1902. The entire success of the scheme is thoroughly emphasized by the fact that the output of the plant has recently been almost doubled, in order to meet the demands of the Kolar gold mining companies for the cheaper power thus afforded. However, provision has been made whereby the City of Bangalore, which has 180,000 inhabitants, is to be supplied with light and power over a separate 60-m., 35,000-volt transmission line. This work has been completed.

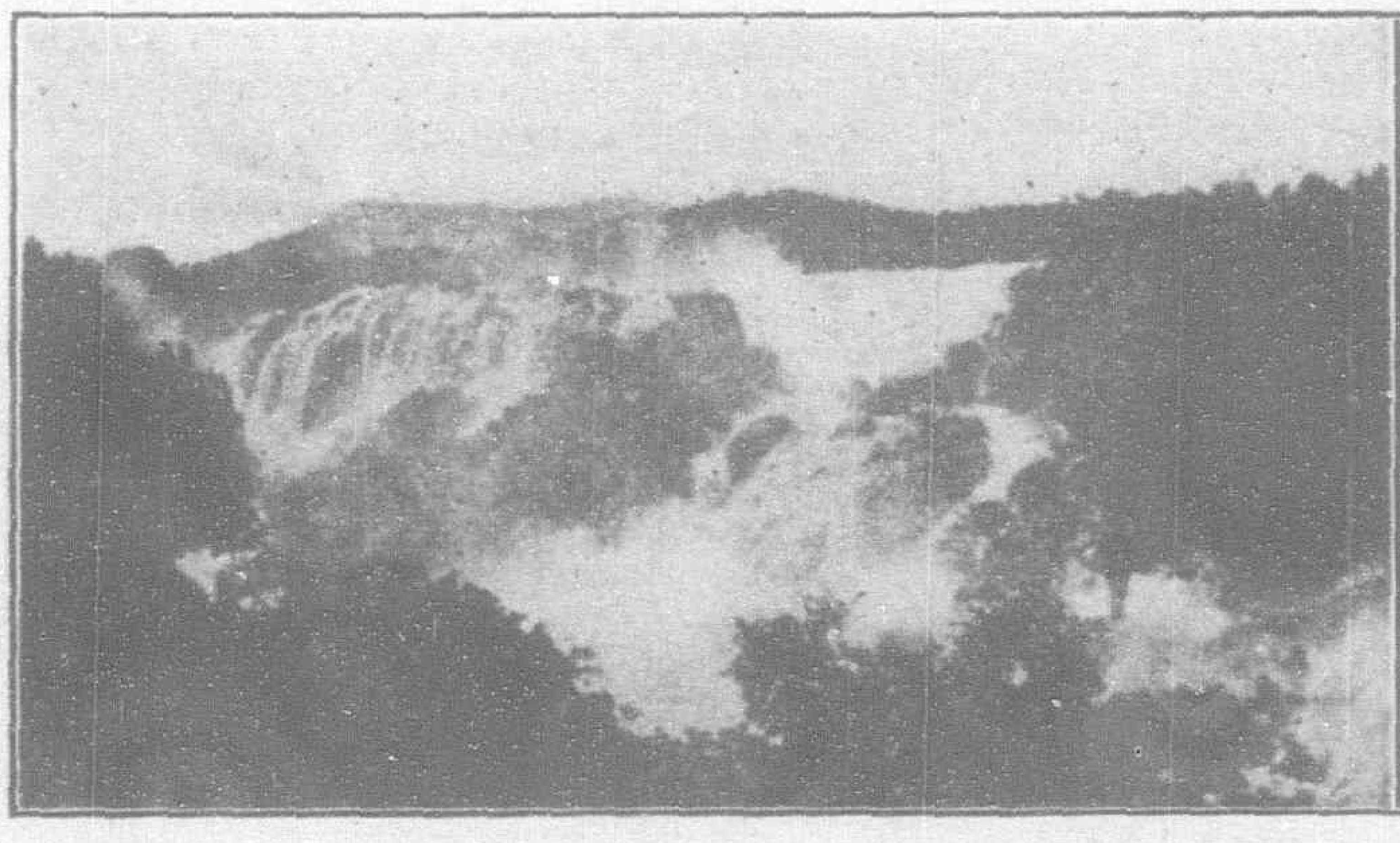
River Works, Channels, Forebay and Pipe Lines.—About ¼ m. above the channel intake, the main river divides into two branches—one flowing E. and the other N. Two low-level masonry dams divert all of the water in the river during the dry season to the channel intake. The upper dam, located about ¼ m. above the intake, and blocking the eastern branch, diverts the water tending to flow that way. The main diverting dam, which is over 2,000' long and V-shaped, extends across the northern branch of the river and finally unites with the natural inner rock wall of the intake channel. During high flood the water sometimes attains a depth of 6' or 7' over the top of the dam.

The headgates at the channel entrances are about ¾ of a m. distant above the Cauvery falls, while the power-house is located approximately 1 m. below the same. The two channels, of which some views are herein given, follow the natural contour of the country and are somewhat more than 3 ms. in length. They are of trapezoidal section, having stone-pitched sides, with a bed width of 18' in earth cutting and 12' in rock cutting. The dividing earth bank partition between the channel measures 26' width at the base and 10' on top. The gradient is 1/5000 for earthwork and 3/5,000 in rock cuttings.

Each channel is supplied with water from the intake channel at the headworks through four vents, each measuring 4½' by 5' section. The velocity of flow in the channels varies somewhat with the gate opening, but the average ranges from 2' to 3' per sec. Scouring sluice vents of 4½' by 5' section are provided on the river side of the intake channel. The two channels, finally brought together, form the forebay, which, in turn, is divided into two sections, though connected together as a whole. One section supplies water to the old penstocks (three in number), while the other supplies the five new stocks. The water might have been brought to the forebay over a much shorter route if wooden flumes could have safely been used; but local engineers considered such a proposition unsound owing to the danger of the flumes being ultimately destroyed by white ants.

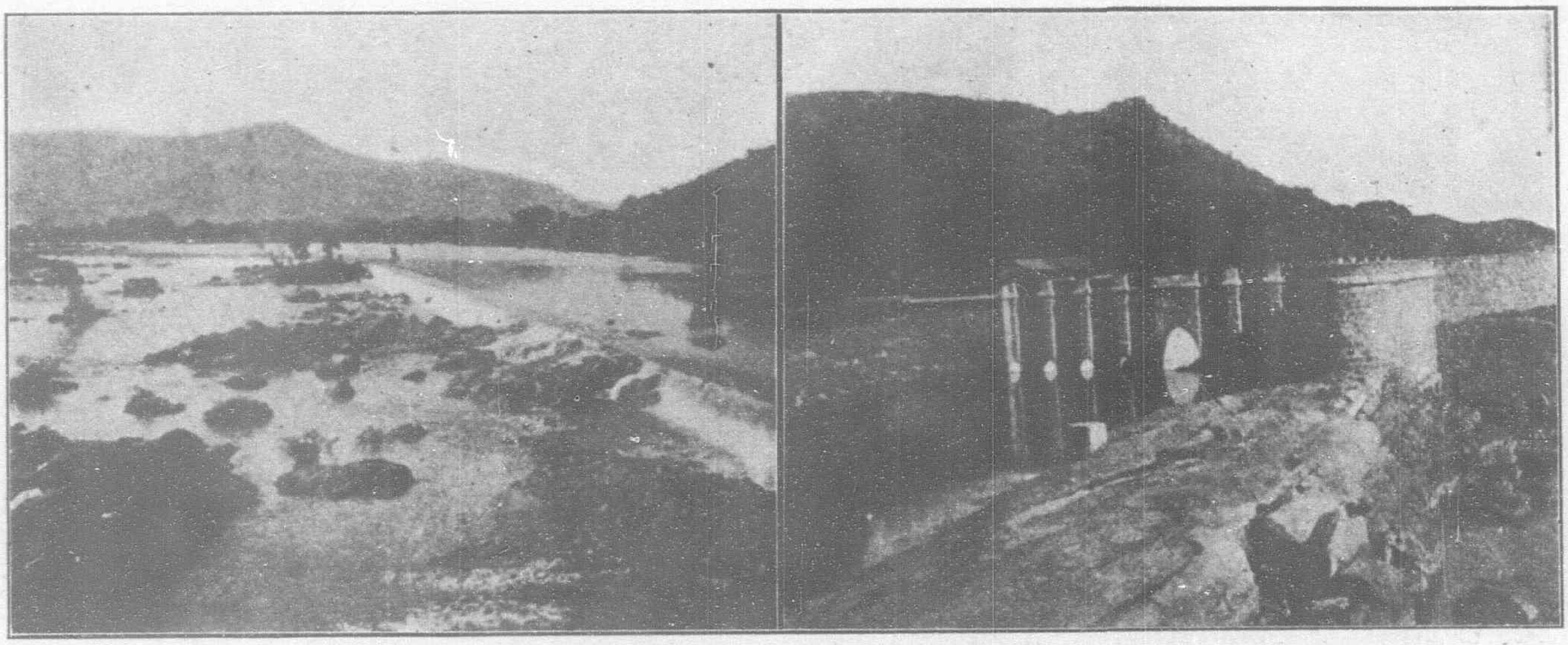
The average depth of water in the forebay is between 5' and 6'. A surplus quantity of water is always allowed to escape over a waste weir at one side of the forebay in order to provide for sudden increase of loads. From the two sections of the forebay, steel penstocks convey the water down the steep bluff to the generating station below. The stocks average 900' length. Each of the five new penstocks supplies one 1,250-brake-h. p. Escher-Wyss horizontal impulse waterwheel, which is direct-connected through a rigid coupling to a 720-kw. General Electric 3-phase alternator. These penstocks vary from 36" to 39" in diameter. The old penstocks, three in number, varying in diameter from 45" to 39", after reaching the powerhouse bifurcate; each branch supplying one 1,250-h.p. turbine. Two expansion joints, adjusted for approximately 5" expansion, are provided in each pipe line.

Entrance of water from forebay to penstock chamber is regulated by a plain vertical iron slide gate controlled by rack and pinions; at the entrance to each penstock is another valve operated by a handwheel. A 10" main conveys



VIEW OF CAUVERY FALLS DURING FLOOD SEASON, E. BRANCH OF RIVER

VIEW OF CAUVERY FALLS AT HIGH FLOOD, N. BRANCH OF RIVER



CAUVERY RIVER ABOVE THE HEADWORKS, SHOWING MAIN DIVERTING MASONRY DAM AND APPROACH TO INTAKE CHANNEL. THE OTHER VIEW SHOWS THE INTAKE CHANNEL AND HEADGATES AT SIVASAMUDRAM

the clear water from the settling chamber at one side of the old forebay to the generating station below, for the operation of the waterwheel speed regulators. Supports for the penstocks, for over ⅔ their length, are masonry piers placed 15′ apart. The average gradient is somewhat more than 30 per cent. All of the penstocks are made of simple lap-riveted steel, varying from ¼″ to ½″ in thickness. These and other piping in the powerhouse were supplied by Messrs. Mechan & Sons, of Glasgow.

Generating Station.—The generating station, or powerhouse proper, is a large building 56′ by 262′, outside dimensions. It may be well to state at this point that all of the principal buildings of the Cauvery power scheme are constructed of granite, and another variety of stone, commonly known as "black trap." Most of the material for the masonry work was obtained in the immediate vicinity.

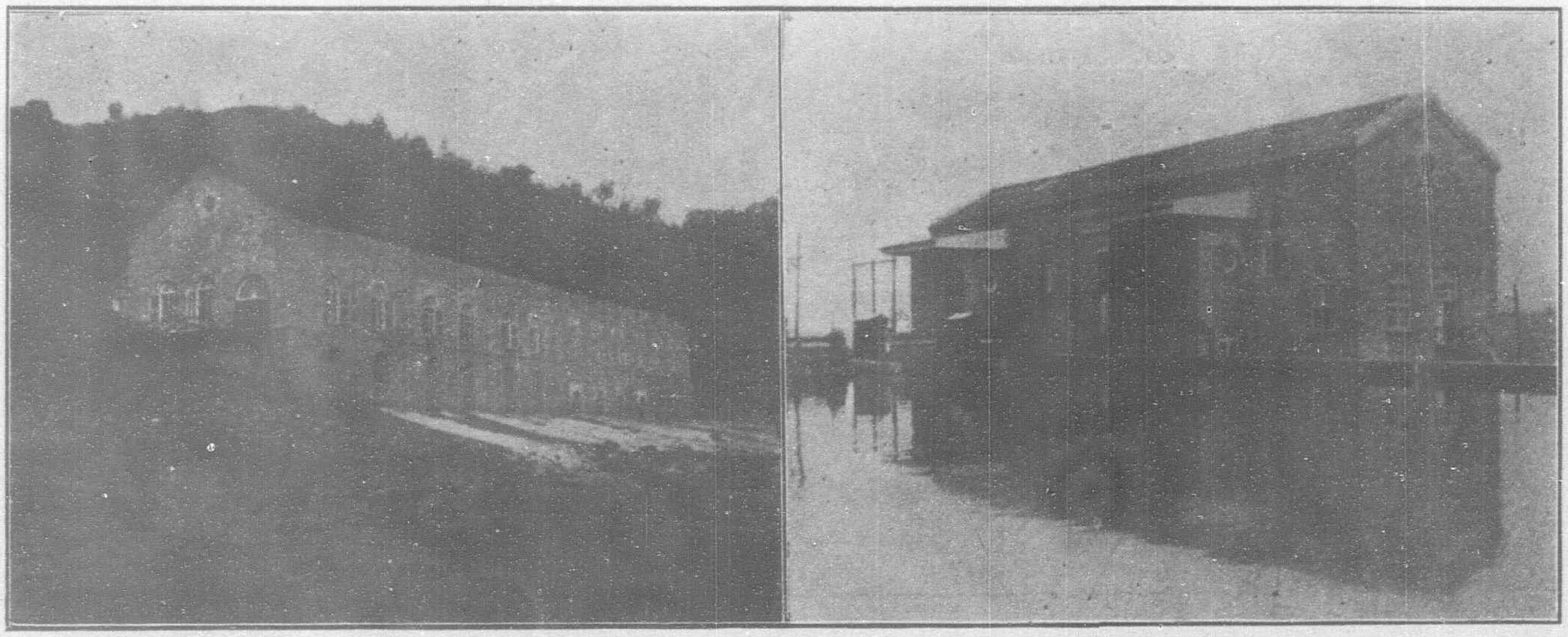
The generating station now contains eleven 1,250-h. p., 720-kw. hydro-electric units and three 125-h.p., 75 kw., exciter units. Switchboards are impaneled in the rear wall of the generating room, enabling the operator to switch any individual machine out of circuit should occasion require. Behind the rear wall of the generating room is an 8′ passageway extending the full length of the station and supplied on one side with stone shelves which support the lead-covered cables leading from the generators and direct-current exciter units to the long stone cable duct which leads up the steep face of the bluff to the transformer station above.

The general layout of generating units and piping within the powerhouse is roomy and convenient. The large turbines contain one solid-cast, 5′ impulse wheel having 24 buckets on its periphery. Each waterwheel has two nozzles which control the supply of water to the wheel proper through 3″×5″ rectangular openings. The nozzles are boot-shaped, with the fulcrum, or pivot-pin, at the heel. The height of the toe in the 3″×5″ admission vent determines the quantitative supply of water to the wheel.

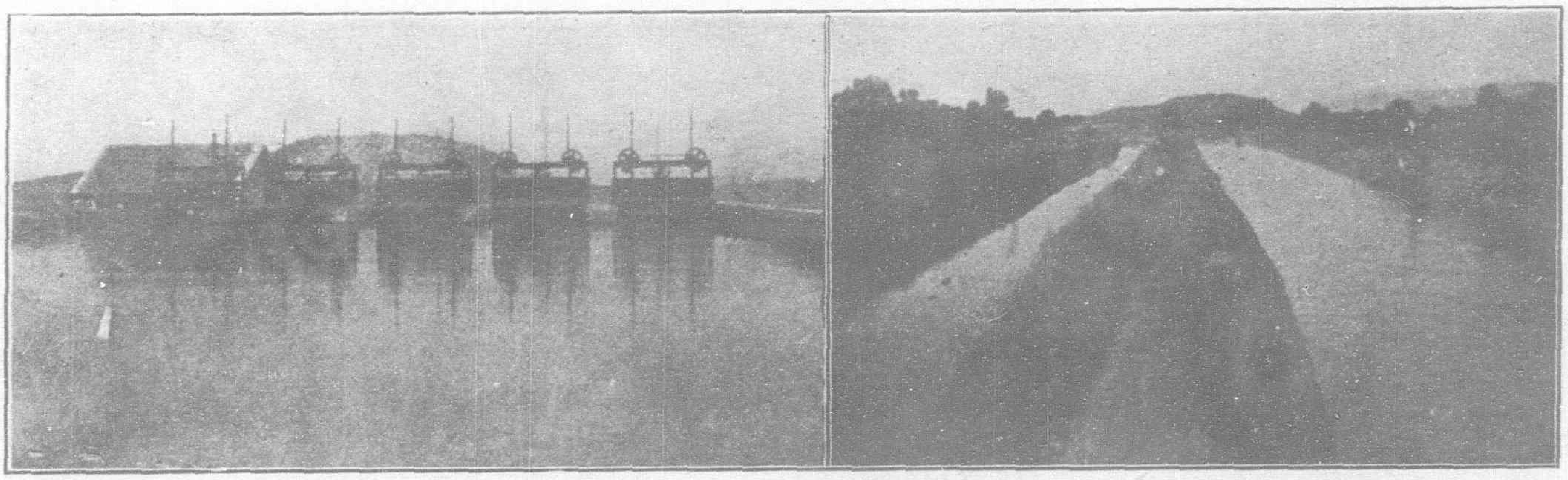
The three small exciter turbines are supplied with water through a 10″ main which is supplied by a tap from each of the large penstocks. The wheel proper of the small turbines is approximately 3′ in diameter with 36 buckets on its periphery.

The most interesting feature connected with the turbines are the hydraulic governors, or speed regulators, which form a part of the wheel, being rigidly connected thereto. These governors are guaranteed by the makers to maintain the water pressure in the pipes constant within 5 per cent of normal under sudden variations of load. For a 10 per cent variation of load only 2 per cent change in speed is guaranteed and only 8 per cent change in speed for 50 per cent variation of load. As before stated, the clear-water pressure is supplied to that part of the governing mechanism which should be the least exposed to wear, hence it is of decided advantage to supply to these parts water which is free of fine sand or other gritty material. However, in case of failure of the clear-water supply, penstock water can immediately be supplied for this purpose through separate taps from the latter to each engine. The action of the hydraulic governor is, briefly, as follows:—

A variation of the station load produces a consequent change in speed of the waterwheel, from the shaft of which the movement is conveyed by means of chain transmission and gearing to the governor fly-ball. The latter, working against a stiff spring, effects a vertical movement of the small governor rod, which in turn controls the movement of a small control valve; the latter is kept constantly in motion by very slight changes of load tending to destroy the equilibrium of water pressure on top and bottom of the valve. So long as the speed remains constant the water pressure on both ends of the valve is maintained the same. A slight movement up or down of the control valve produces a relatively greater movement of the larger hydraulic piston, to which is attached through connecting rods the two large boot-shaped nozzles. In case of a great change of load



GENERATING STATION AT SIVASAMUDRAM, AND THE SET-UP TRANSFORMER STATION, WITH FOREBAY IN THE FOREGROUND



PORTION OF THE NEW SECTION OF FOREBAY, SHOWING THE VERTICAL SLIDE GATES AT THE ENTRANCE TO THE PENSTOCK CHAMBERS, AT SIVASAMUDRAM, AND A VIEW OF THE TWIN CHANNELS IN THE EARTH CUTTING APPROACHING SIVASAMUDRAM

such as that caused by a short-circuit on the transmission lines, resulting in the entire station load being eventually thrown off, a large relief valve quickly opens and allows the surplus or impact water to escape. This valve slowly closes against oil-pressure as the load resumes its normal value. Thus it will be seen that the relief valve takes care of the sudden impact of water when a large amount of power is suddenly switched off in much the same manner as the ordinary overflow standpipe for low-pressure heads. A general idea of the size and shape of the speed regulators may be obtained from accompanying photographs.

Turbines and Generators.—The guaranteed efficiency of the large turbines is 75 per cent and 70 per cent at full load and ½ load respectively, producing 1,250 brake h. p. at the coupling with 37 cu. ft. of water under an effective head of 382½′ at the turbines. Some 10′ of head were lost on account of having to locate the generating units above the highflood level of the river. The water during the major portion of the yr. is quite free from grit, and the steel cups, after 3 yrs.' service, show an almost imperceptible amount of wear.

The generators are 720-kw., 3-phase, 2,200 volt, 25-cycle, 300-r. p. m. machines of the revolving-field type and are Y-connected with nutral not grounded. Since these machines are of the well-known General Electric type, no further details are necessary regarding them; suffice it to state that they have given entire satisfaction and no trouble since the plant was first put in operation.

(To be continued)

GERMAN JEWELRY IN THE PHILIPPINES

United States Consul Brittain, of Kiel, Germany, reports as follows regarding shipments of jewelry from his consular district to Manila:

During the past 4 mos., or since it has been necessary to consulate invoices for the Philippine Islands, the jewelry manufacturers of Pforzheim have had invoices for Manila amounting to nearly $25,000. During the same period many shipments under $100 in value were made, which would probably increase the above amount very considerably. The jewelry consists principally of ladies' chains, brooches, earrings, bracelets, rings, and pins. Much of the jewelry is of 12 and 14 carats gold, and also cheaper goods.

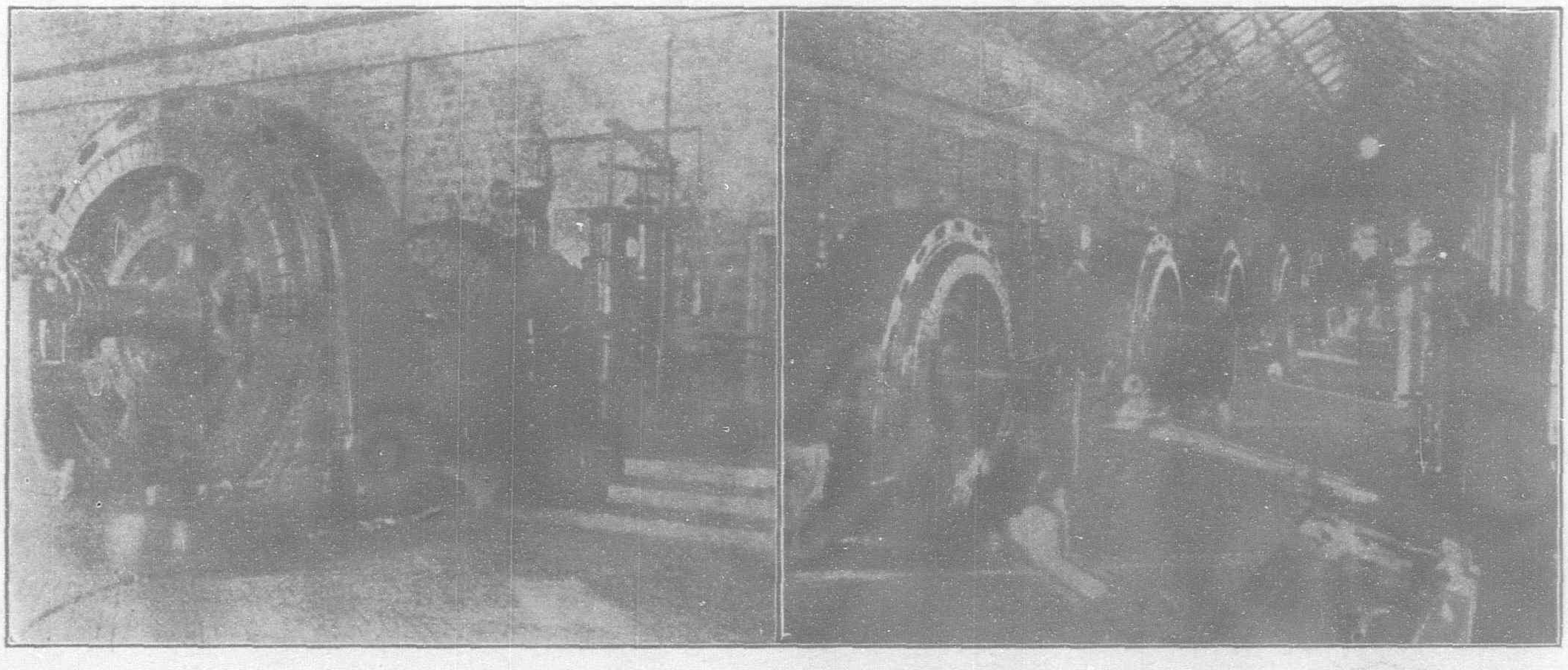
Pforzheim is a city of about 65,000 population and is devoted almost exclusively to the manufacture of jewelry, there being about 500 factories where jewelry is made. It is the jewelry center of Europe. The various manufacturers are very energetic and are careful to study the wants of their customers, and endeavor to please them regarding designs, prices, and terms of sale. From present indications the shipment of jewelry to the Philippines will amount to about $100,000 for the fiscal year. With the American manufacturer's advantage in distance and machinery—as much of the Pforzheim jewelry is made by hand—it appears that we should capture more of the trade of the islands.

The facts are the German manufacturer often wins by easy terms of sale as to credits and discounts and making what the customer wants, in quality and design, and the American maker loses because he demands cash before his goods leave America, and attempts to sell in the Philippine Islands designs, suited to Philadelphia or New York trade. Recently a young German came to me and said he could sell 50 to 75 American machines of a certain make if he was sure the machines would do what was claimed for them.

REVIEW OF PUBLICATIONS

SHANGHAI—ITS SIGHTS AND SCENES.—We have received from Messrs. Kelly & Walsh, Ltd., an artistically arranged album of photographic illustrations of the Settlement of Shanghai, and the surrounding country. The views are splendidly reproduced, and present the principal buildings of the "Paris of the Orient," scenes on its streets and of the river life, together with interesting and beautiful illustrations of the country just beyond the borders of the municipality. The album contains nearly 50 attractive illustrations for $2. It can be obtained at any of the stores of Messrs. Kelly & Walsh—in Yokohama, Shanghai, Hongkong, and Singapore.

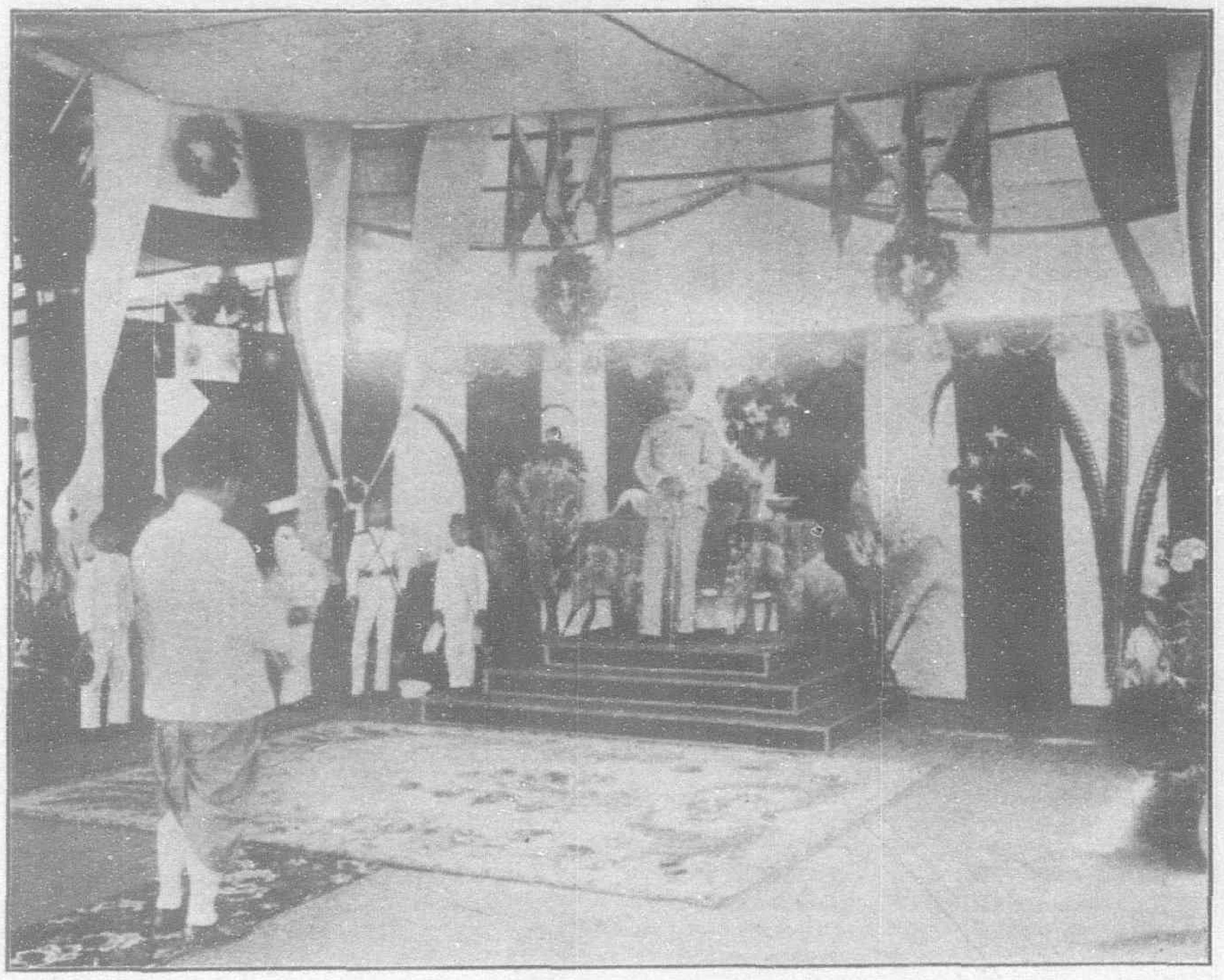
GAS, GASOLINE AND OIL-ENGINES.—This is a new and revised edition of *Gas, Gasoline, and Oil-Engines*, by Gardner D. Hiscox, published by the Norman W. Henley Publishing Company, 132 Nassau-st., New York City, and is illustrated by 351 engravings. The book represents and illustrates the details of design, manufacture, and management of a new and progressive prime-moving power, and is brought up-to-date in a most exhaustive, interesting and instructive style. Price: $2.50 gold.



1,250 H. P., 720-KW., "GENERAL ELECTRIC" TURBO-GENERATOR UNIT SHOWING THE SPEED GOVERNOR; ALSO A GENERAL VIEW OF THE POWER STATION INTERIOR AT SIVASAMUDRAM

CONSTRUCTION OF BAN PHAJI-PAKNAMPOH SECTION OF SIAM RAILWAYS

The Ban Phaji-Paknampoh section of the N. line of the Royal State Railways of Siam, was recently opened by the king, with the usual ceremony. This line begins and branches off at Ban Phaji of the Korat line and traverses the whole length of the Menam Valley for the benefit of the people in their commercial and agricultural enterprises.



ACTING MINISTER OF PUBLIC WORKS REPORTING ON THE CONSTRUCTION OF THE NEW LINE TO THE KING OF SIAM

Mr. M. L. Weiler, director-general of Siamese railways, has furnished THE REVIEW with a copy of the report read by the acting minister of public works, before the King of Siam, on the occasion of the opening of the line, in which that official deals at length with the construction of the railway. Unfortunately for engineers, illustrations of the construction can not be had, the only photograph obtainable from the Royal Railway Department at Bangkok, at all available—even remotely—for these columns, being the one herewith presented.

COMMENCEMENT OF CONSTRUCTION.—Work on the Ban Phaji-Paknampoh line was begun in December, 1897, and the first section to Lopburi, 42 kilometers in length, was opened April 1st, 1901. From Ban Phaji to Lopburi the line traverses paddy fields with patches of jungles. The Menam Prasak is crossed at Tarua with a steel bridge of 103 meters. The country traversed is flat, Lopburi being only a trifle higher than Ban Phaji. Grades and curves are consequently very moderate. Owing to these facts only 460,000 cubic meters of earthwork were executed, at a cost of Tcs. 332,000, or Tcs. 7,800 per kilometer. For the acquisition of land only Tcs. 1,442 of Tcs. 34 per kilometer were spent. Besides the large bridge crossing the Menam Prasak there are two more steel and 28 wooden bridges on the line.

PERMANENT WAY.—The rails are the same as those used on the Korat Railway. In general, wooden sleepers were used, the greater part of which was supplied from the Korat District, the remainder being procured locally. For a stretch of 7 kilometers, iron sleepers were used as a trial. These sleepers are 2.25 meters long and have a weight of 54½ kilos. The cost of one iron sleeper, including freight to Bangkok, is Tcs. 6.50 against Tcs. 1.50 to Tcs. 1.75 of a wooden sleeper. The ballast was supplied from Pak Preo quarry. Platelaying was started in November, 1898, and the railhead reached Lopburi July 23d, 1900.

LOPBURI-PAKNAMPOH SECTION.—This section has a length of 118 kilometers. In May, 1902, the construction of this line was practically started in earnest. The line traverses a straight route through a rich rice district, which, in the absence of good waterways, promises a better revenue for the railway. In addition, sections of the country formerly practically out of reach and to a great extent covered with jungle, will be opened up for settlement. The country traversed is flat with slight variations, and the line is therefore fit to cope with goods and passenger traffic on a large scale.

For land acquisition the average cost was Tcs. 60 per kilometer, whereas Tcs. 2,091 per kilometer were paid on the Petchaburi line for this item.

Earthworks.—Of the 1,600,000 cubic meters of earth and rockwork built only 88,600 cubic meters were derived from excavations, which shows that the line is mostly lying on banks. The material for the construction of these banks was taken from borrow pits along the line, and consisted mostly of clay. The cutting material was rocky and near Chongkeh a solid rock cutting, consisting of hard lime stone, required the blasting of 10,382 cubic meters of rock. Special difficulty was met with in the filling of the bank from 158 kilometers to 160 kilometers, including Paknampoh station. Though these banks reach a height of 8 meters at places, the high flood nearly reached their tops. Extensive landslides occurred repeatedly during construction, and doubtless it will take years before the banks are properly settled. The station yard at Paknampoh alone required the execution of about 80,000 cubic meters of earthwork. These works were done by means of locomotive power in using first a light railway of 50 centimeters gauge and later on a full-gauged locomotive with 15 trucks. The total cost of earth and rockwork on the Paknampoh line was Tcs. 1,200,000 or Tcs. 0.75 per cubic meter, or respectively Tcs. 10,170 per kilometer against Tcs. 0.61 per cubic meter, as against Tcs. 9,203 per kilometer on the Petchburi Railway.

Permanent Way.—The rails for this section are the same as on the Korat liner. The ballast was provided locally from a number of quarries along the line. The orders for the permanent way material for the whole N. line to Chiengmai were 30,000 tons and amounted to £202,000, of which the greater part—£172,000—for rails, fell to English, and the remainder—£30,000—for small iron materials, to Belgium manufacturers. Platelaying was started April 1st, 1904, from Lopburi, and later on also from Paknampoh. The connection of the rails took place August 28th, 1905.

STATION BUILDINGS.—On the Lopburi-Paknampoh section the station buildings are wooden structures with roofs of corrugated iron. A locomotive shed with turntable is provided at both Lopburi and Paknampoh.

ROLLING STOCK.—Rolling stock is being used for both the Korat and Lopburi lines together. Altogether 18 locomotives, 36 passenger coaches and 251 freight and ballast cars have been purchased. In closing the account of both lines Tcs. 357,000 were transferred from the Korat to the Lopburi line, leaving a balance of Tcs. 1,600 for the Korat line. The rolling stock bought on account of the Paknampoh line consists of 12 locomotives and 187 carriages. The Locomotives were bought in Gemany for the total sum of Tcs, 512,000, while the orders for the 187 carriages were placed by tender with a firm in Belgium, the total amount being approximately £39,000.

EXTRAORDINARY WORKS.—The increase of traffic to be expected between Bangkok and Lopburi owing to the opening of the new line to Paknampoh necessitated the extension of existing station yards between Bangkok and Lopburi, as also the arrangement of new crossing stations. The expenses for these works, including all materials, will amount, when completed, to about Tcs. 150,000.

The total cost of the Lopburi line was Tcs. 2,050,000 or Tcs. 48,200 per kilometer. The total cost of the Paknampoh line cannot yet be ascertained exactly as the construction is not fully completed. The Director-general of railways estimates that the total cost of the Paknampoh line will be near to Tcs. 6,800,000 or Tcs. 57,600 per kilometer. The Korat Railway has cost Tcs. 67,000 per kilometer; the Lopburi line Tcs. 48,200; the Petchaburi line Tcs. 53,300. The average cost of the total railway system amounts to Tcs. 60,703 per kilometer, with which the average cost of the Paknampoh line compares fairly well.

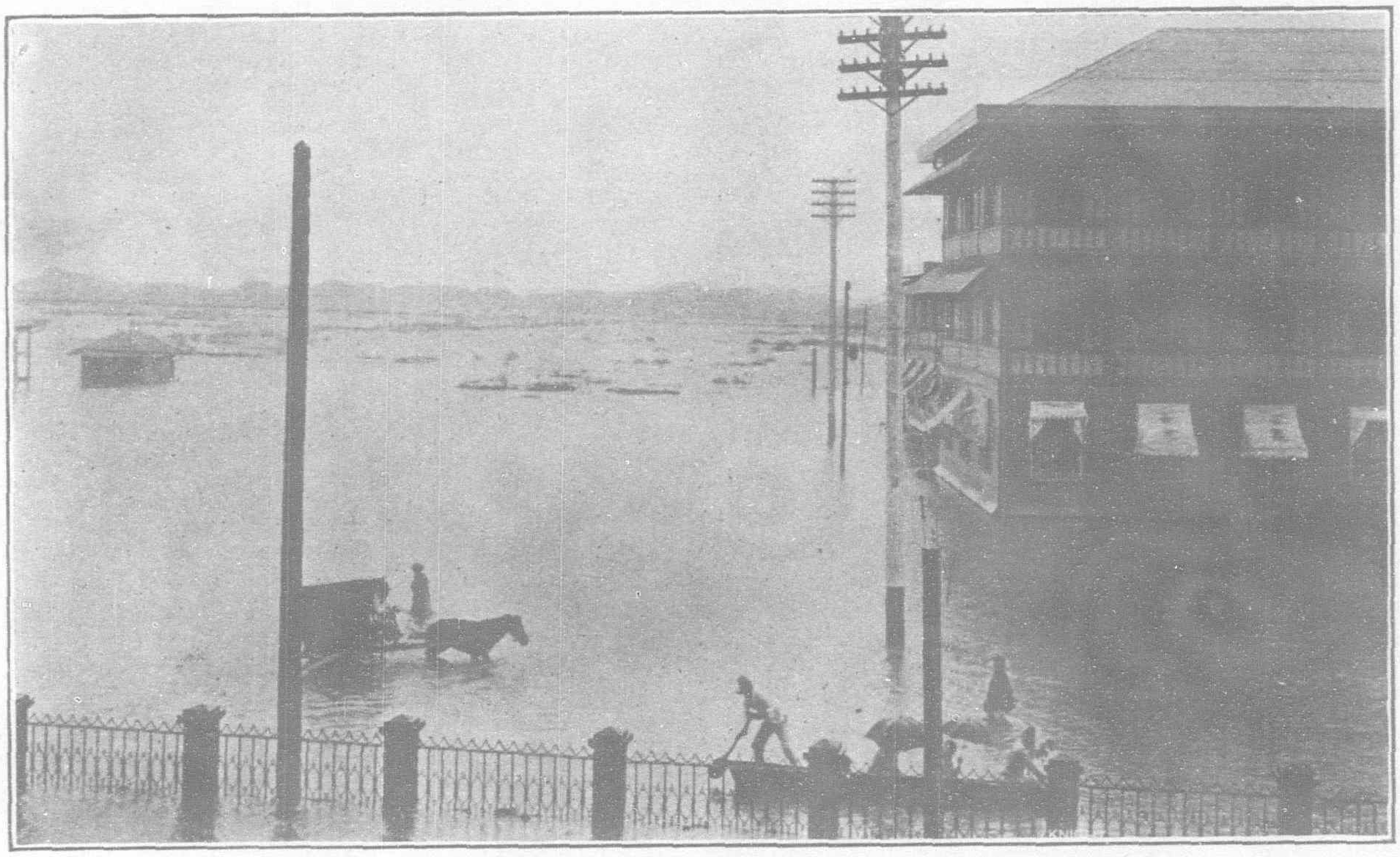
AMERICAN ASSOCIATION IN CHINA

The annual meeting of the American Association in China was held recently in the Chamber of Commerce of Shanghai. The treasurer's report showed a credit balance in the Hongkong and Shanghai Bank of $1,180.38. The following officers were elected for the current year:—President Dr. Gilbert Reid; vice president, Mr. J. F. Seaman; secretary, Dr. C. M. Lacey Sites (reëlected); treasurer, Mr. A. J. Thomas; executive committee, Dr. Gilbert Reid and Messrs. A. S. Fobes, S. Fessenden, P. W. Irvine, Dr. Sites, Mr. W. A. Reed, Mr. Seaman, Dr. C. S. F. Lincoln, Dr. A. P. Parker, Mr. Thomas, and Mr. Tucker.

REORGANIZATION OF S. C. FARNHAM, BOYD & CO., LTD., SHANGHAI

The great shipbuilding and general engineering business of Messrs. S. C. Farnham, Boyd & Co., Ltd., of Shanghai, was recently reorganized. The affairs of the old company will be wound up voluntarily by liquidators who are authorized to register the new concern under the name of The Shanghai and Engineering Dock Company, Ltd. At the meeting which resulted in this action 33,000 shares were represented, and Mr. J. Prentice, managing director of Messrs. S. C. Farnham, Boyd & Co. presided. The directorate of the new company will be composed of the following gentlemen:—Mr. J. Prentice, managing director; Sir. C. J. Dudgeon, of Messrs. Ilbert & Co., Shanghai; Mr. W. J. Gresson, of Messrs. Jardine, Matheson & Co., Shanghai; Mr. A. Korff, of Messrs. Melchers & Co., Shanghai; Mr. James Johnston, Mr. H. von Rücker, and Mr. S. Groundwater.

Engineering Progress During the Fiscal Year 1904-05 in the Reconstruction of Manila



CITY HALL, BAGUMBAYAN DRIVE, DURING THE FLOOD OF JULY 13th AND 14th, 1904

The report of the Department of Engineering and Public Works of the City of Manila for the fiscal year ended June 30th, 1905, just issued as a section of the annual report of the Municipal Board, furnished abundant material of a most interesting nature covering the operations of this department during the period under consideration.

All the business of the entire department is conducted through the general office. From July 1st, 1904, to November 10th, 1904, Major J. F. Case, the then city engineer, was on leave of absence in the United States, and the work of the department was carried on by Mr. S. B. Patterson, 1st assistant city engineer. On April 1st, 1905, Major Case was relieved of the duties of City Engineer to become Chief Engineer, Department of Sewer and Waterworks Construction. From that date to the end of the fiscal yr. 1905 the department was under the direction of Mr. H. E. Hyde, 1st Asssistant Engineer, as Acting City Engineer.

Water Supply and Sewers.—This division includes everything connected with the water supply of Manila, including the pumping station at Santolan; also all work connected with the building of sewers and drains. The work of filling the moat was also carried out under the direction of this division. Considerable work was done during the fiscal year at the pumping station, as the high water of the previous yr. nearly carried out the dam located in the Mariquina River, from which all city water is pumped. The walls of the dam and the intakes had to be practically rebuilt. The dam is now in better condition than ever before. The pumping machinery itself gave little trouble, although two of the pumps have been in operation 18 yrs., the other two having been installed during American occupation. The floods of 1904 caused considerable damage to the 26-in. pipe or conduit which carries the water from El Deposito to the city-distribution system. The pipe line was realigned, and from El Deposito the San Juan Bridge raised on concrete piers, thus elevating the pipe above the ground and preventing any further damage from washouts. Below the crossing at Santa Mesa Road the conduit was lowered a large part of the way and is now free from proposed streets, etc. El Deposito or the large storage reservoir has been thoroughly cleaned and repaired where necessary, and during the period under consideration experiments were carried on here to determine the action of copper sulphate on amœbæ, but the experiment did not prove a success as far as the destruction of the amœbæ was concerned.

An accurate survey of the reservoir and grounds was made and the storage capacity of the reservoir determined. The storage capacity is approximately 19,000,000 United States galls.

The city-distribution system has been kept in good repair and considerable work done on the installation of new mains and hydrants. At present the water service is insufficient for fire protection, this being most apparent in Paco and other outlying districts of the city.

In 1904 a road locomotive and cars were purchased for the purpose of hauling coal to the pumping station and gravel from the Mariquina River, the gravel being used to resurface the Santolan Road. There are approximately 200 tons of coal used per mo. at the pumping station, and the cost of hauling this coal by team was about ₱4 per ton. The cost of hauling by the engine is considerably reduced.

Draining and Filling of Moat and Lowlands.—Among the most important works undertaken by this division was the draining and filling of the moat and lowlands. Work was commenced without the possibility of more than a reconnaissance survey of the improvement. In all three outfall sewers were decided upon, one discharging to the W. end of Calle Bagumbayan into the bay and two at the W. of the S. approach to the Bridge of Spain.

The first, to drain that part of the Walled City limited approximately by Calles Palacio and Anda and the W. wall, was given an outfall S. of the new harbor works. At its junction with the wall two branches were extended along the outside of the wall, one NW. to the old outfall of the Calle Anda sewer at the bastion on Calle Anda and the other NE. to the old Real Gate. The second, draining that part of the Walled City limited by Calles Anda and Palacio and the E. wall was constructed from the old arch culvert under the roadway W. of the Bridge of Spain to the bastion at that point and thence along the outside of the wall to Calle Victoria. The old box sewers in Calles Baluarte and Fundacion were discharged into the sewer at the Victoria Gate. The third, draining that portion of Ermita limited by Washington Boulevard, Calle Arroceros, and the moat, was built along the wall of the outer moat and discharged into the old arch culvert at the E. side of the Bridge of Spain. Spillways were designed to control the overflow of water from the sludge pipe, and were installed at Fort Santiago and at the Bridge of Spain W. of the S. approach.

The general method of construction was uniform throughout. Wooden piles 2″× 4″ × 4″ were driven at a distance of from 3′ to 5′ apart to the depth of about 16′ into the ground, braced at the bottom against the wall along the sewer grade, and firmly nailed. On the outer faces of the piles 2″ planking on edge was driven to a firm foundation about 2′ below the determined invert of the sewer, nailed to the piles, and closed with light battens at the joints. This planking was carried about 1′ above the elevation of the spillways. Little leakage occurred along these joints, indicating careful work.

It was difficult, however, to secure a tight joint at the bottom, and considerable leakage of mud into the sewer was encountered. To reduce this leakage a series of gates was constructed to afford a back hydrostatic pressure in the sewers. Upon sufficient drying out of the mud these gates were removed and the water allowed to drain off. The sewer discharging at the Malecon Drive was protected by banks of earth along both sides to prevent overturning, as filling by the dredger did not proceed simultaneously on both sides.

Method of Filling.—The dredger was connected to a 24″ steel pipe extending along the S. side of the area lately reclaimed in the harbor improvement, N. of the Legaspi monument, to the moat. Branches were laid from this as the work required. The surplus water was allowed to flow over the spillways already mentioned and flashboards inserted as necessity for preventing passage of the mud occurred. Careful attention was paid to the flow of the mud and regular inspections made of the provisional sewers. Filling commenced on February 12th and the dredge stopped pumping on May 18th. After 6 wks. of settling the filling subsided about 6″.

A great quantity of shells was deposited near the discharge end of the pipe, and this material was used in building dams for the lowland filling and for backfill at several points along the provisional sewers. This material affords an excellent foundation for pipe sewers and a quantity has been stored in the yards for sewer work.

Filling Low Grounds.—The territory affected by this filling extended from Bagumbayan Drive to Calle San Marcelino and the Estero de Concepcion and from Calle Concepcion to and beyond Calle Nozaleda, terminating at the E. side of Camp Wallace but excluding that land occupied by the storehouses of the United States Army. An earth dike about the limits of this area was thrown up so as to control the liquid mud, and four spillways were constructed to discharge into the Estero de Concepcion. This dike was reenforced with shells deposited by the sludge pipe. The method of filling was precisely that used for the moats.

Cost of Work.—The total cost of filling the moats and low grounds was as follows:

Materials	₱22,839.97
Labor	15,724.70
Transportation	1,324.15
Engineering and superintendence	830.35
Total	40,719.17

Miscellaneous Works Necessitated by the Filling.—Consequent upon the filling of the moat and low grounds the drainage system of the Walled City and a portion of Ermita was affected, necessitating several minor structures.

The closing of the outlets to the gutters on the Malecon required some provision for drainage of the roadway, and a 30-centimeter box gutter was built on the E. side of the drive from the Santa Lucia building to the Pasig River and from Santa Lucia gate to the provisional sewer discharging at the Legaspi monument. This work cost in all for the 947.3 meters laid ₱3,596.12, or ₱3.81 per meter.

A similar condition held with Calle Nozaleda and Bagumbayan Drive. It was decided to make the necessary work a permanent one and a 15″ vitrified-clay pipe sewer reducing to 12″ was laid from the Estero de Concepcion to Bagumbayan Drive. The sewer will provide for all drainage on Nozaleda and Bagumbayan Drive and will be a portion of the final drainage system.

Size	Length in meters	Cost.	Cost per meter.
15 inch	175	₱2,657.10	₱15.19
12 inch	175.75	2,247.99	12.79

For the drainage of the land about the United States Army storehouses and the morgue a 12″ vitrified-clay pipe 70 meters in length was laid to the Estero de Concepcion at a cost of ₱680.59, the portion of the labor furnished by United States Army not being charged to the work. The cost per meter was ₱9.72.

Temporary wooden inlets from the Bagumbayan Drive to the filled moat were laid and a permanent catch-basin constructed at the corner of Calle Concepcion at the Calle Victoria extension, costing ₱70.61.

Storm-Water Drainage.—Estero levels were taken by gauges located throughout the city. Observations commenced at noon on January 9th, 1905, readings being made of the gauges at the stations at intervals of an hour and a half, day and night, continuously. There were established in all 26 gauge stations.

The work was done by natives who were more or less familiar with rod readings, etc. There were in all 24 men employed to make the gauge readings. These men were divided into day and night shifts of 12 hrs., with a foreman and assistant foreman to each gang. Three were assigned to each observer, at distances apart not greater than might be covered in 30 mins. by walking, were graduated into meters, decimeters, and centimeters. Readings were taken to the nearest centimeter. Capillary attraction was neglected. The results obtained were in general satisfactory, though occasionally errors were made which, however, were of so apparent a nature that they were easily eliminated. Curves plotted with time intervals as abscissas and heights above mean lower low water as ordinates were drawn.

A study of these curves reveals the following:

(*1*) High water in the esteros occurs at a more or less definite period of time after high water in the bay, depending upon the distance from the bay.

(*2*) Low water in the esteros is higher than in the bay.

(*3*) High water in the esteros is always lower than in the free bay.

(*4*) At a point near mean tide the level of water in the bay and in the esteros is equal.

(*5*) It can be assumed that during the dry season the water in the esteros is wholly tide water.

(*6*) The velocity of the water in the esteros is therefore small, and during this time silting up of the esteros is greatest.

(*7*) Most of the silting up will occur at ebb tide when the hydraulic radius is decreasing.

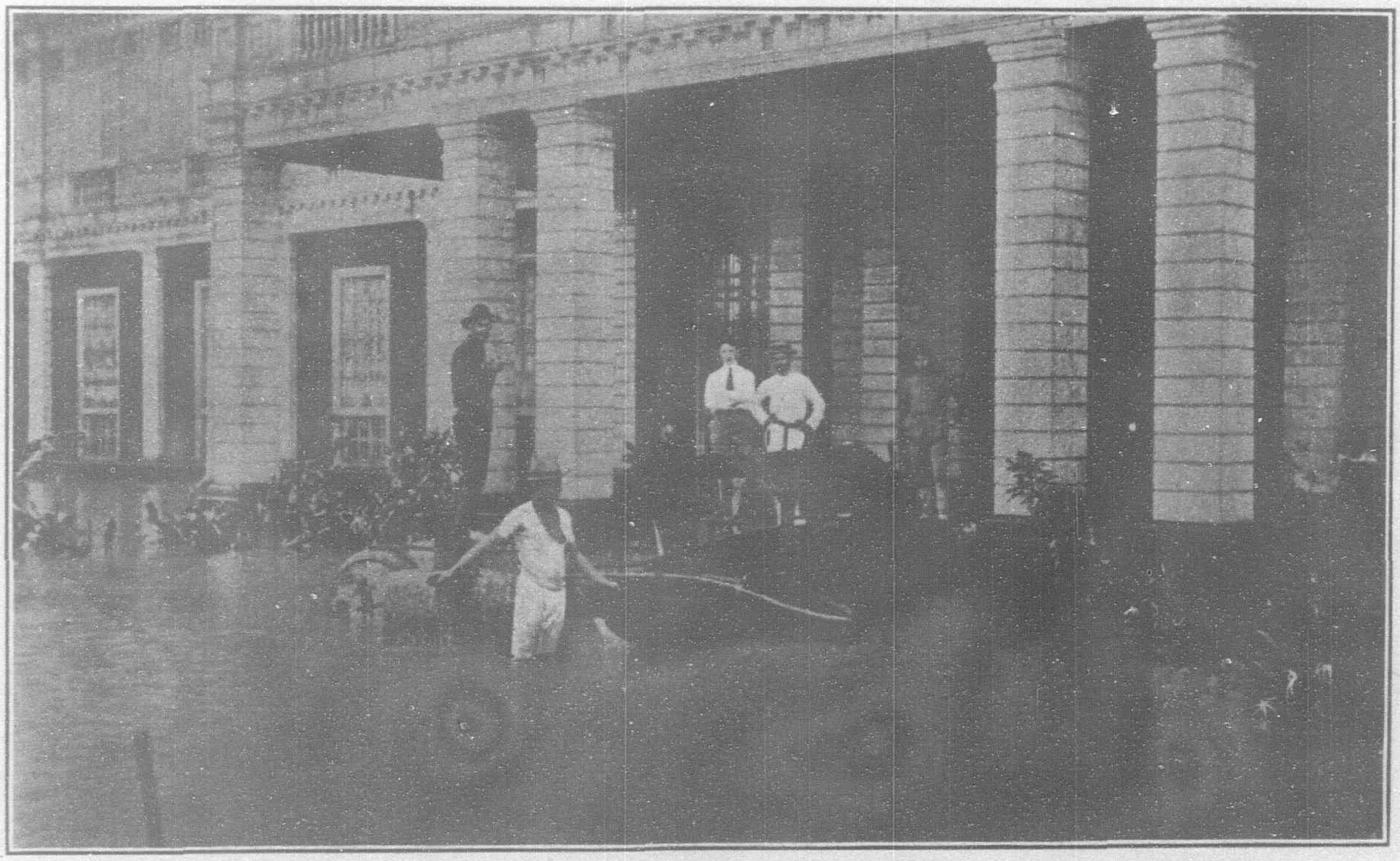
It is believed that the esteros should be deepened by dredging so as to give a greater velocity of flow by increase in the hydraulic radius.

Rainfall.—In the previous annual report it was noted that only 16 rainfalls of 2″ per hr. intensity had been recorded. Closer examination of the Weather Bureau records revealed the fact that there occurred five storms during the past fiscal year of intensities greater than 3″ per hr. From this information it was seen that to provide for rainfalls of less than 2″ per hr. as fixed in the preliminary design would be distinctly unwise. Sewers constructed under assumption of a 2″ rainfall and a run off 75 per cent have shown no evidences of failure and have not been the cause of any serious flooding of the streets. On the other hand, it would be extremely unwise to design sewers to provide for these excessive rainfalls because of necessary economy in expenditures, of the small headroom possible, and of the restricted cross section of the esteros and the Pasig River on which the discharge at high water is largely dependent. Furthermore, these excessive rainfalls occur only over small periods and flooding in the low districts which must happen in any event will not cause serious inconvenience.

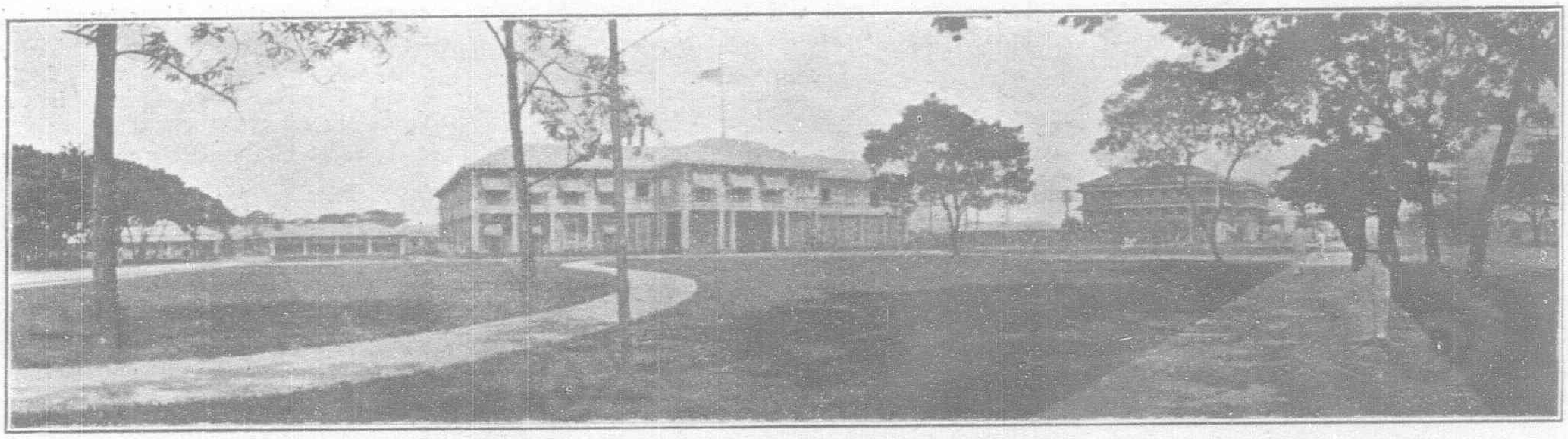
Run-off Coefficient.—Rough observations on flow toward inlets indicate that the assumption of the coefficient of run off, 75 per cent, is not warranted in all districts, being too small in the Walled City and too great for the less-built-up sections. Certain modifications were, therefore, required. The modified coefficients decided upon were as follows:

	Per cent.
For heavily built-up sections	90
For ordinary business and residential sections.	75
For suburban sections	50

Inlets.—The rule establishing the maximum run in gutters of 120 meters has been shown to be insufficient to satisfy the conditions. Long runs in gutters prevent the speedy removal of the water from the street surface and bring about unnecessary flooding. The



BUREAU OF PRINTING, BAGUMBAYAN DRIVE, DURING THE FLOOD OF JULY 13TH AND 14TH, 1904



BUREAU OF PRINTING AND CITY HALL, SHOWING IMPROVEMENTS OF GROUNDS, 1905

inlet gratings are satisfactory and pass easily the water, but the street grades are too flat to bring the water up to them quickly enough. The maximum run in gutters has now been fixed at 100 meters.

All inlets constructed during the year were provided with silt basins, and the effect of this construction upon the sewers was quite noticeable in the June inspection. Very few street washings have passed the basins and the sewers are reasonably clean.

Street Grades.—This important matter demands prompt attention. Without a proper reconstruction of the streets parallel with sewer construction there will be no economy, and in the lack of attention to this detail sewers will be built which will be of only temporary utility. Grades for several districts have been designed, but the available force is too small to allow of the work being carried to a rapid completion. It has come to the attention of the office that curb elevations have been changed without its knowledge, thereby seriously affecting the drainage schemes. It is strongly recommended that no future changes be made without previous consultation.

The minimum grade adopted—2 per 1,000—has been found no more than sufficient to remove water from the streets, and any reduction in this, even at the cost of a large amount for filling, would be extremely unwise.

Construction.—Thirty new sewers were designed and built during the year. There were several sewers whose construction afforded more than passing notice. The drainage of the District of Binondo was notably in bad shape, and examination of the sewers before relaying of the pavements on Calle Rosario and the Escolta was required. The sewers on these streets and Calle Nueva were in almost a falling condition and in danger of rupture. The Escolta sewer W. of Calle Nueva, indeed, fell in upon uncovering and was entirely rebuilt of concrete in place. The roof of the Nueva sewer was repaired with concrete, a new concrete invert was laid, and the sides plastered with cement mortar. Only little attention could be given to the Rosario sewers because of the necessity of clearing the street in advance of the repaving. Whenever possible advantage was taken of the old work and the sewers trimmed up so as to reduce as far as might be the friction coefficient. All down-spout connections and drainage pipes were directly run to the sewers. The complete drainage of the district immediately surrounding the Cuartel de Meisic was affected by the construction of sewers on Calle Elena and Calle Soler and across some private lands. The low district about Calle Gallera was also drained by a concrete sewer discharging into the bay.

All structures over 60 centimeters in diameter were built of gravel concrete in the trench. Except in the case of the Cuartel de Meisic main sewer, no reenforced concrete was used, but in that case the headroom was so small that an especially reenforced top was required, which was built of old girder rails spaced 1′ apart and covered by concrete filling.

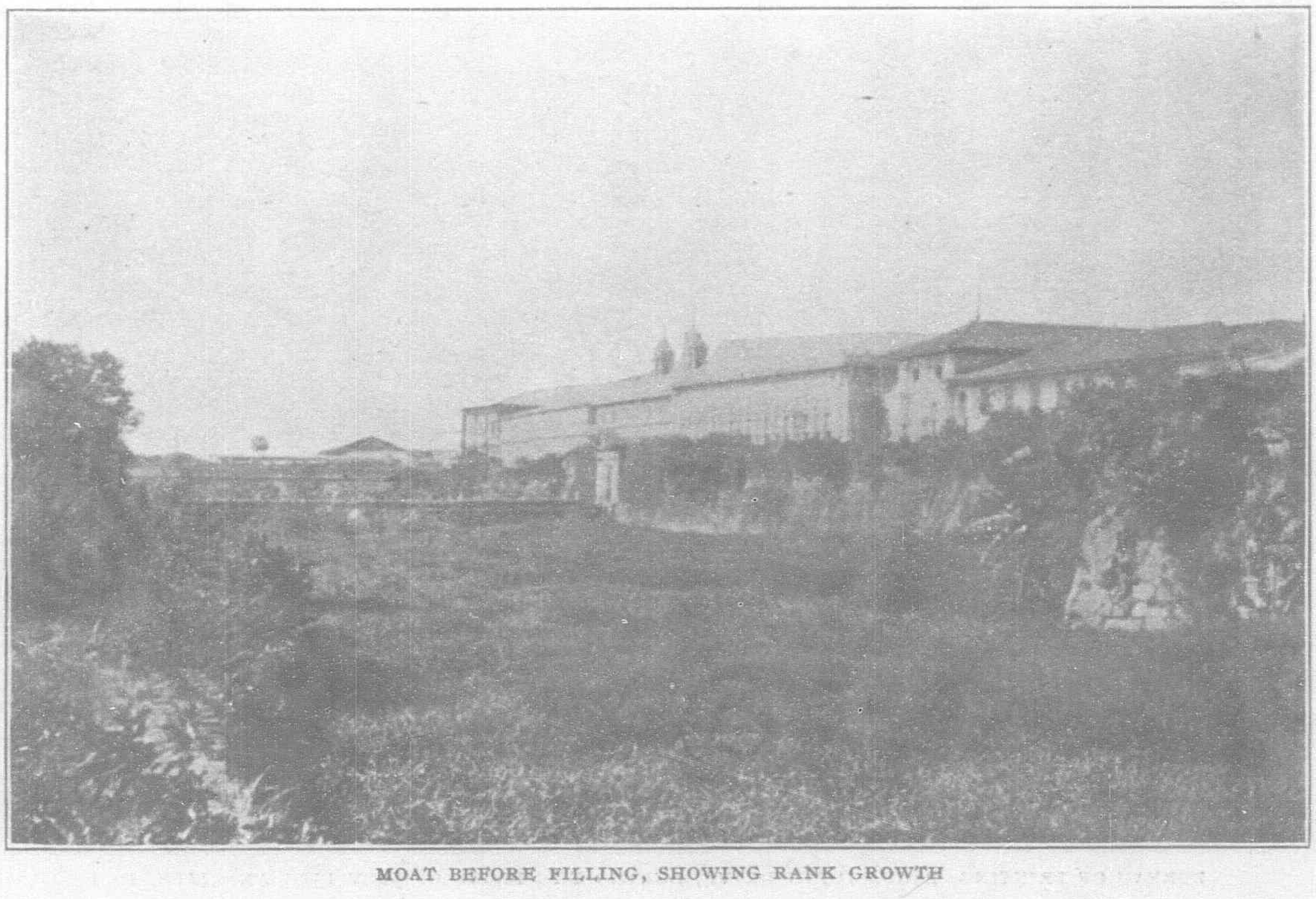
Estero Cleaning.—A small amount of work was done, but more attention should be given to the water courses, which have rapidly silted up. These courses should without doubt be cleaned and deepened, and it is hoped that this work may be carried on during the present year with the 8″ Gould centrifugal pump soon to arrive.

Building Operations.—The total building permits issued during the fiscal yr. were 5,435, as against 5,102 in 1903-4, making an increase of 333.

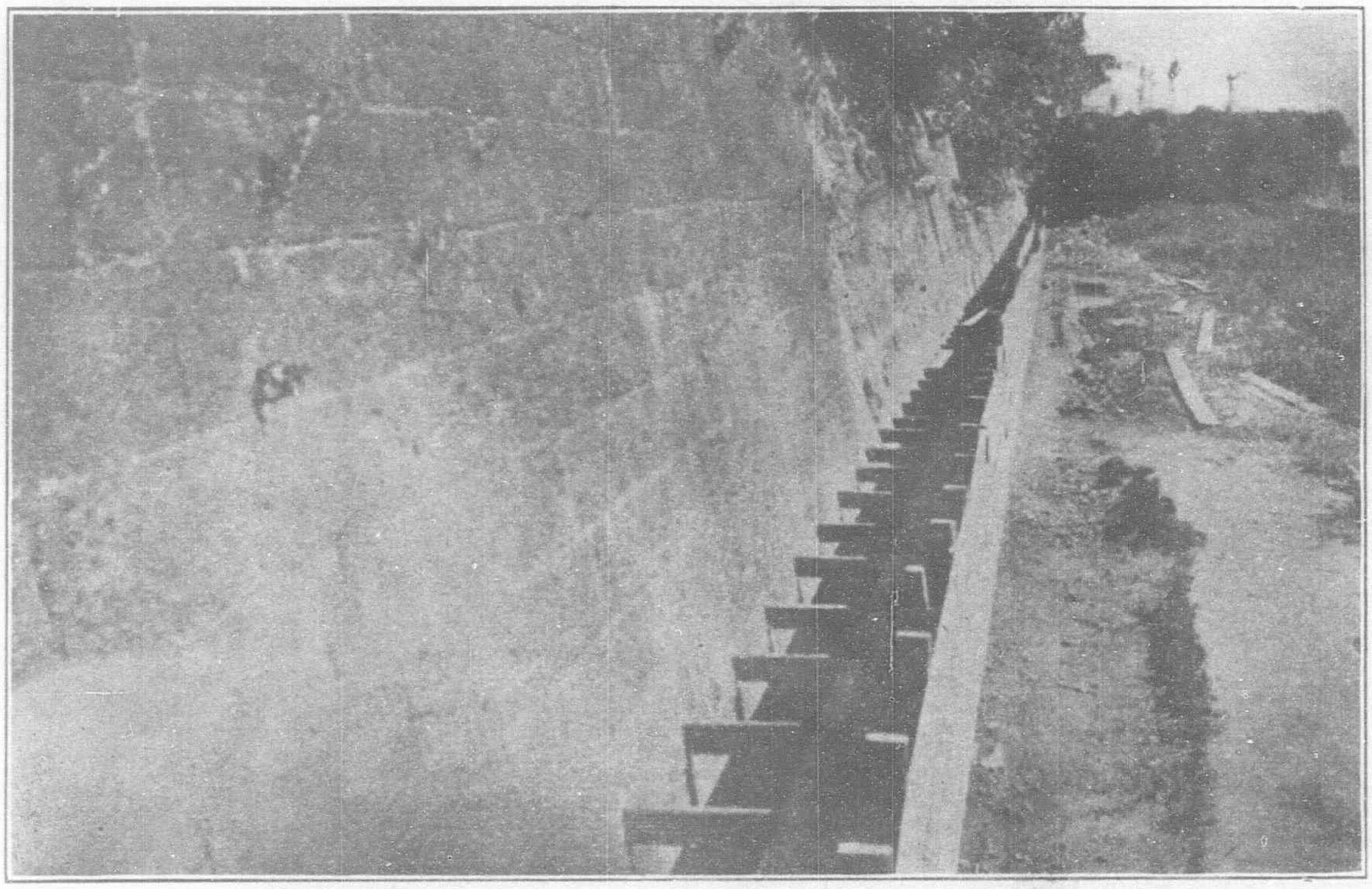
Public Lighting.—The municipality had lights in operation at the close of the yr. as shown by the following statement:—

Arc lights:	
2,000 candlepower (streets)	286
2,000 candlepower (harbor)	15
2,000 candlepower (parks and grounds)	2
2,000 candlepower (matadero)	4
1,500 candlepower (markets and public buildings)	17
Total arc lights	324
Incandescent lights:	
20 candlepower (streets)	936
20 candlepower (Divisoria market)	100
16 candlepower (municipal buildings)	1,056
10 candlepower (municipal buildings)	4
Total incandescent lights	2,105
Fan connections	25
Motors	6

The foregoing shows an increase over the previous yr. of 25 arc lights and 98 incandescent lights (public buildings); also a decrease of 126 incandescent street lights, which is brought about by the discontinuance of that number and substituting arc lights, greatly benefiting the service. Total cost of public lighting for the yr., ₱101,729.81. Total cost of repairs and increases to electrical service for the yr. amounted to ₱1,779.23.



MOAT BEFORE FILLING, SHOWING RANK GROWTH



TEMPORARY DRAINAGE SCHEME IN MOAT WHILE BEING FILLED

Telephone Service.—The total cost of telephone service for the yr. was ₱2,468.22.

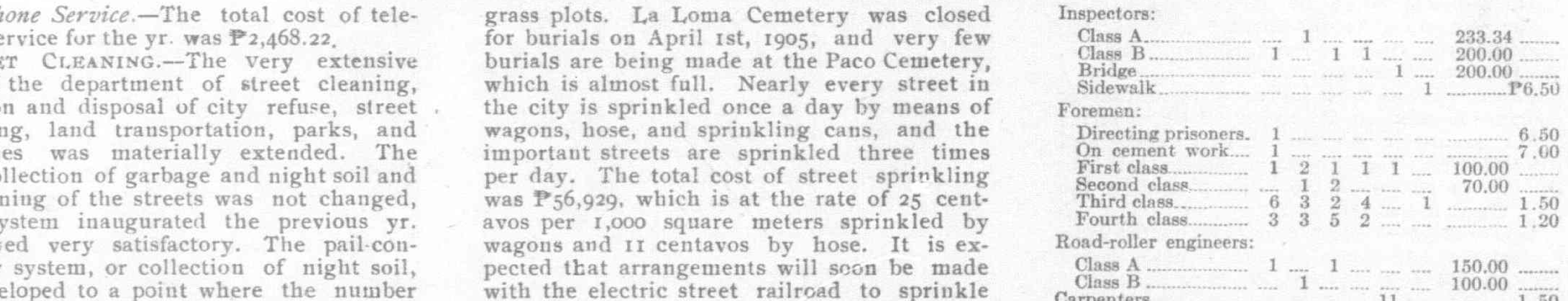
STREET CLEANING.—The very extensive work of the department of street cleaning, collection and disposal of city refuse, street sprinkling, land transportation, parks, and cemeteries was materially extended. The night collection of garbage and night soil and the cleaning of the streets was not changed, as the system inaugurated the previous yr. has proved very satisfactory. The pail-conservancy system, or collection of night soil, was developed to a point where the number of pails installed in private buildings was almost doubled. In July, 1904, a total of 52,794 pails were cleaned, whereas in the month of June, 1905, the department handled 95,254 pails. In addition to being well operated from a sanitary standpoint, this work was found to be profitable, and the monthly revenue to the city is gradually increasing. The work of cleaning vaults shows an increase of about 20 per cent over the fiscal year 1904. Over 3,500,000 square meters of streets are cleaned daily at the small cost of ₱0.09 (4½ cents, United States currency) per 1,000 square meters. The Palomar crematory was shut down on May 1st, 1905, and all the garbage, etc., formerly cremated at this place is now carried to the Cementerio del Norte and used for filling. Many improvements have been made in this new cemetery in the way of laying out and grading the plots on each side of the main road, the planting of trees, and the converting of suitable spaces into grass plots. La Loma Cemetery was closed for burials on April 1st, 1905, and very few burials are being made at the Paco Cemetery, which is almost full. Nearly every street in the city is sprinkled once a day by means of wagons, hose, and sprinkling cans, and the important streets are sprinkled three times per day. The total cost of street sprinkling was ₱56,929, which is at the rate of 25 centavos per 1,000 square meters sprinkled by wagons and 11 centavos by hose. It is expected that arrangements will soon be made with the electric street railroad to sprinkle all streets on which car tracks are laid at a much less cost than the present system.

STREET CONSTRUCTION AND BRIDGES.—Each district of the city is in direct charge of an inspector who reports daily to the chief inspector the condition of the streets in his district, the progress of work, and at the same time consults with him as to the best method of prosecuting the work. The following table shows the class of labor employed in the actual work of street construction and repair of bridges, the assignment by districts and the rate of pay *per diem*, per mo., which does not include the force employed on launches, barges, or at the city quarry:—

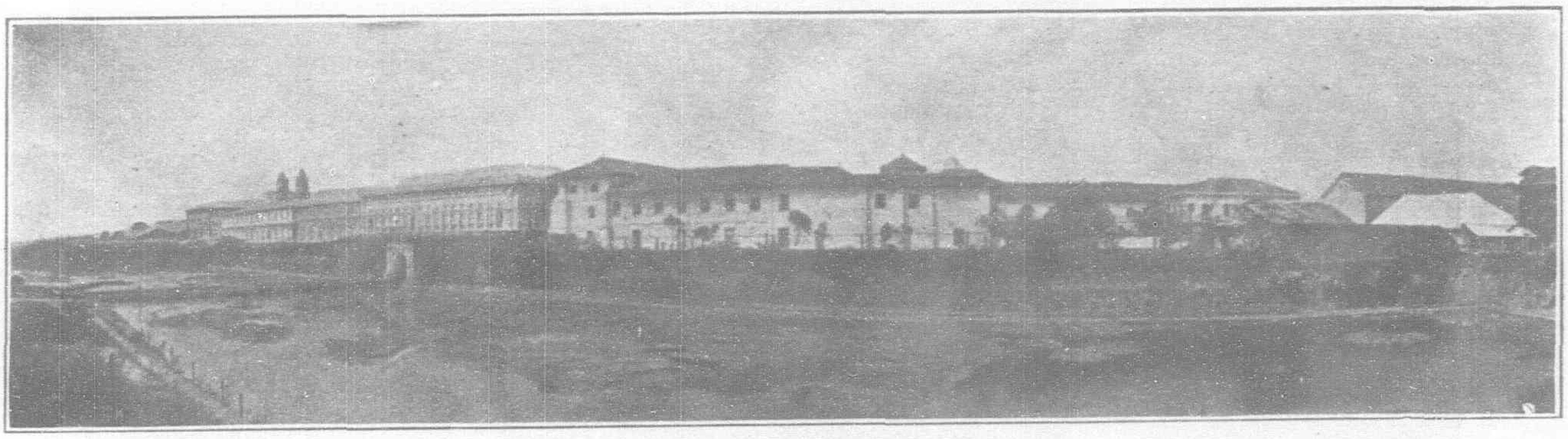
Class of labor.	Division, by districts						Rate.	
	No. 1.	No 2	No. 3.	No 4	Bridge	City	Per month	Per day
Chief inspector						1	₱266.66	
Inspectors:								
Class A		1					233.34	
Class B	1		1	1			200.00	
Bridge					1		200.00	
Sidewalk						1		₱6.50
Foremen:								
Directing prisoners.	1							6.50
On cement work	1							7.00
First class	1	2	1	1	1		100.00	
Second class		1	2				70.00	
Third class	6	3	2	4		1		1.50
Fourth class	3	3	5	2				1.20
Road-roller engineers:								
Class A	1		1				150.00	
Class B		1					100.00	
Carpenters					11			1.50
Masons	15	15	7	1	12			1.50
Blacksmith					1			1.20
Laborers	88	106	78	59	33			1.00
Total	117	132	97	68	59	2		

Hired and City Transportation.—The following table shows the amount of city and hired transportation used during the yr., the transportation of the Insular Purchasing Agent being consolidated with that of the city:—

Month	City transportation.		Hired transportation		
	Double team, at ₱6 per day.	Dump cart, at ₱3.75 per day.	Double team, at ₱10 per day.	Dump cart, at ₱6 per day.	Bull cart, at ₱6 per day
1904					
July	179	421	553		36
August	195	310.5	877.5		25
September	195	272	843	145.75	



SECTION OF MOAT, SHOWING PIPE DISCHARGING HARBOR DREDGINGS FROM THE ATLANTIC GULF AND PACIFIC COMPANY'S POWERFUL DREDGE *MANILA*



MOAT FILLING ALMOST COMPLETED

October	456	458	269.5	191	....
November	424	608.5	275	199.5	....
December	351.5	818	322	180.5	....
1905.					
January	356.5	1,166	266.5	183.5	....
February	262.5	703.5	341	168	....
March	307	496	448.75	187.75	....
April	764	438	117	124	....
May	600.5	774.25	....	....	....
June	738.5	524.5	....	....	....
Total	4,830.5	6,990.25	4,313.25	1,380	61

Wood-Block Paving and Installation of Cement Sidewalks and Curbing of Calle Rosario, Escolta, and Plaza Moraga.—The contract for laying a wood-block paving on a 15-centimeter concrete foundation and filling the joints with paving cement was let in February, 1904, to H. A. Belden, manager for J. G. White & Co., at the following figures:—

For removing the old block paving, including all excavation and compacting subgrade, ₱2.65 per cubic meter.

For furnishing and laying a 15-centimeter concrete foundation, ₱2.20 per square meter.

For laying a wood-block pavement and filling the joints with paving cement, including the transportation of blocks furnished by the city, ₱1.15 per square meter.

Before the contractor could commence work it became necessary for the city to install cement curbing and to examine the sewer and water pipes and to rebuild the Escolta sewer. The sewer and water work was performed by the office of water supply and sewers. Each property owner was informed of the proposed work and notified to have all necessary connections made before the new pavement was installed. All the property owners agreed to have the city install cement walks in front of their property at a cost to the property owner of ₱3.60 per square meter. This work was performed in conjunction with the installation of cement curb. The line used on Calle Rosario was for an 18-meter street, a width of 12 meters between curbs being allowed for the roadway. The width of the sidewalks will be 3 meters when buildings are moved back to the new line. The line used on the Escolta was for a 14-meter street, a width of 9 34 meters between curbs being allowed for the roadway. The width of the sidewalks will be 2.33 meters when the present buildings are moved back to the established line. The present width of walks on the S. side of the Escolta from Calle Soda to Plaza Goiti in a number of places is less than ½ meter. It is thought that the owners along this section will make the necessary alterations to their buildings in the near future so as to provide the proper width of walk on this side of the street.

Cost of installing wood-block paving on Rosario, Escolta, and Plaza Moraga

	Square meters.
Total area between curbs	11,094.19
Track and 18 inches each side	4,341.54
Area paved at city's expense	6,752.55

Total cost of excavation, concrete, and laying wood blocks (area of track section not included)		₱41,150.49
Wood blocks, 300,218, at ₱92.78 per 1,000 (plus 10 per cent)	₱30,639.65	
Wood blocks, 336,588, at ₱79 per 1,000 (plus 10 per cent)	29,249.49	
		59,889.14
Total cost of paving		101,039 63
Less track section:		
Concrete foundation, 4,341.54 meters, at ₱2.20	₱9,551.39	
Wood blocks, 249,204, at ₱79 per 1,000 (plus 10 per cent)	19,687.12	
Laying wood blocks, 4,341.54 square meters, at ₱1.15	4,992.77	
		34,231.28
Total cost to city for laying 6,752.65 square meters		66,808.35

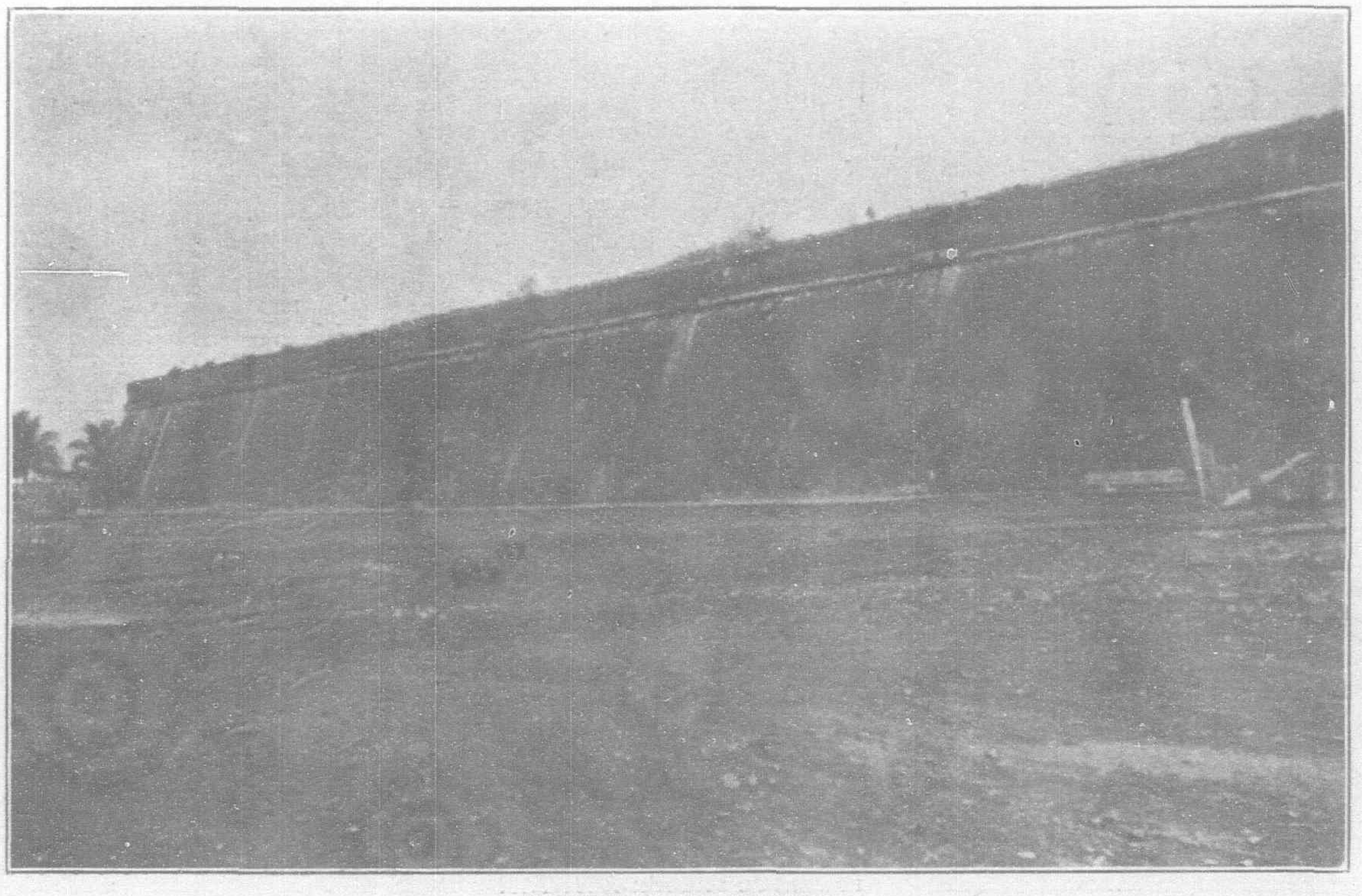
Or ₱9.89 per square meter.

Three hundred thousand two hundred and eighteen blocks were purchased at ₱92.78 per 1,000 and 336,588 at ₱79 per 1,000. Ten per cent should be added to this price, however, to cover the price paid the Insular Purchasing Agent.

The following statement shows the cost of installing cement curbing and sidewalks on Calle Rosario, Plaza Moraga, and the Escolta:—

Cost of installing 2,033 linear meters of cement curb	₱7,424 73
Cost of installing 3,969 square meters of cement walks	12,441.58
Total	19,866 31

The abutting owners paid the city at the rate of ₱3 60 per square meter for installing the cement walks, or a total of ₱12,516.12. Includes removing China stone walk and excavation.



SECTION OF FILLED MOAT

VIEW OF ESCOLTA EARLY IN 1904

Wood Block Paving on Plaza Cervantes Including a Portion of Calle Anloague:—The following statement shows the cost of removing the old granite-block pavement, resetting curbs, and laying the wood-block paving on a concrete base:

125.4 linear meters curbing reset, at ₱2 60 per linear meter	₱326.16
Removing granite blocks and preparing foundation over 1,922 square meters, at ₱0.47 per square meter or ₱1.58 per cubic meter (4,200-foot haul for round trip)	911.15
Laying 1,922 square meters 6-inch concrete foundation, at ₱1.42 per square meter 1:2½:5	2,726.74
Furnishing and laying 1,922 square meters wood blocks (labor laying, ₱0.55; cost of blocks, ₱4.72 per square meter; mostly 8-inch blocks, ₱0.543 per square meter)	10,122.41
Sand cushion and top dressing, at ₱0.12 per square meter	238.50
Pitching 1,922 square meters, at ₱0.38 per square meter	738.39
Total	15,063.35

364.46 square meters of cement walk was also installed on Plaza Cervantes for which the abutting owners paid at the rate of ₱3.60, or ₱1,312.05.

The work of laying a wood-block paving on a concrete base was performed by this department.

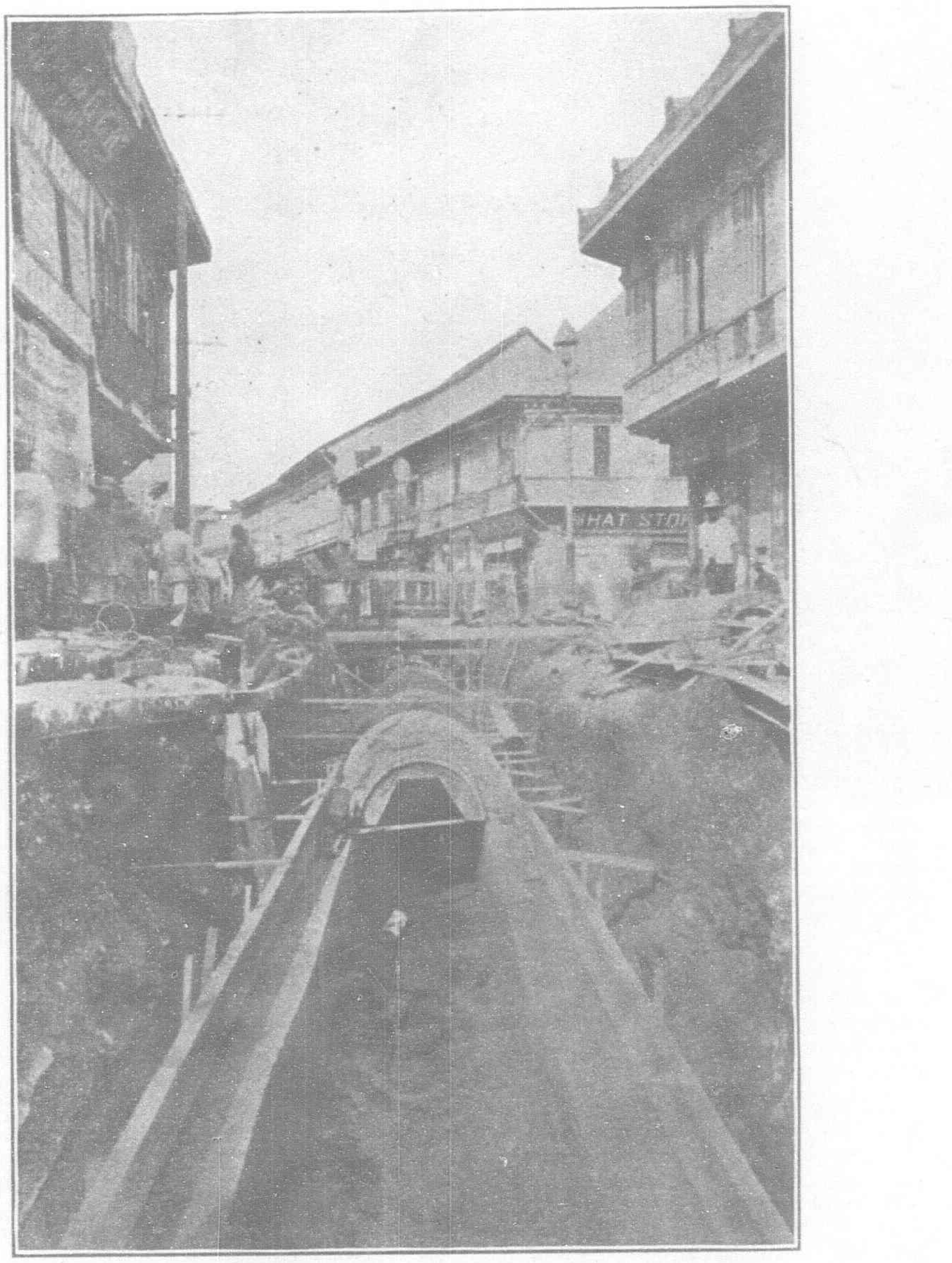
The following statement gives a comparison of the relative cost of the block paving laid in Plaza Cervantes by the city and the block paving laid in Rosario and the Escolta by J. G. White & Co.:—

Plaza Cervates:	Per square meter.
Preparing foundation, at ₱1.58 per cubic meter	₱0.47
6-inch concrete foundation	1.42
Wood blocks (₱0.543 per square meter, at ₱79 per 1,000, plus 10 per cent)	4.72
Laying	55
Sand cushion	12
Pitching	.38
Total for completed pavement	7 66
Rosario and Escolta:	
Foundation, at ₱2.65 cubic meter	59
Concrete foundation	2.20
Wood blocks, 57.4 square meters	5.95
Laying	1.15
Total for completed pavement	9 89

All wood blocks in Plaza Cervantes cost ₱79 per 1,000, plus 10 per cent for Purchasing Agent charges. In Calles Rosario and Escolta 300,218 blocks cost at the rate of ₱92.78 per 1,000.

Length of Streets.—The length of streets within the city limits is now approximately 146,111 linear meters, or 90.7 ms. The pavement

VIEW OF ESCOLTA APRIL 15th, 1905, SHOWING MANILA ELECTRIC RAILROAD AND LIGHT COMPANY CAR



SEWER CONSTRUCTION, ESCOLTA

consists of wood block, granite block, and macadam, apportioned as follows:—

	Square meters
Wood blocks	17,432
Granite blocks	3 7,679
Macadam	1,299,014
Total	1,354,125

Prison Labor.—A force of 75 prisoners was employed during the yr. for removing a portion of the old wall back of the Intendencia building, for loading wagons with broken stone, for removing the retaining wall around the moat, and for various street works. The guard consisted of two American and six native police. One American foreman, one native foreman, and one tool man was the force required to handle these prisoners to advantage. All prisoners used were short-time men with only from 1 to 6 mos.' term, and therefore could not be worked as well as longtime prisoners. The reason for this is plain, for it will be seen that a prisoner's term would expire just about the time he was becoming familiar with the work, which necessitated the continual breaking in of new men.

The prisoners commenced work at 7 o'clock and worked till 11.30. They were allowed 2 hrs. for dinner and then started in at 1.30 and worked till 4 o'clock.

The amount of work performed by one street laborer per day equals the amount which three prisoners will perform in the same length of time. The difference in the amount of work performed is due to the fact that a prisoner shirks every chance he gets. He has no interest in the work and it is almost an impossibility to make him perform an average day's work. The best results were obtained in removing the old city wall along the Pasig River to make room for the new city docks. The maximum amount of labor was obtained on this work, as it was possible to handle the prisoners within a smaller area than on other classes of work. In contrast to the above work may be mentioned the grading of Dee Street. On this work the prisoners were stationed along the street for a distance of 300 meters, and it was found almost impossible to handle them to advantage. During the yr. 15,361 cubic meters of stone was removed from the old city wall and from the retaining walls around the moat for use in street work.

Steam Road Rollers (cost of operating per day equals ₱11.23.)—The three road rollers have operated 115 days each during the yr. Each roller was overhauled at the city shops, the boiler tested, and the engine put in good condition. Value of unexpendable material issued to rollers during the year equals ₱391.56.

The following statement shows the cost of operating the three rollers for the fiscal year ended June 30, 1905:—

Labor	₱5,779.00
Coal, 262.3 tons; oil, waste, etc.	3,841.12
Repairs	998.38
Total	10,618.50

City Quarry. (Located on the Island of Talim, Laguna de Bay.)—The output of the quarry for the fiscal yr. 1905 as compared with the fiscal yr. 1904 increased from 33,045 cubic meters to 49,211 cubic meters. One new No. 6 Gates crusher was installed to replace the Blake and Austin crushers which had become worn out. The two Gates crushers when working 9 hrs. per day are able to crush approximately 400 cubic meters of stone.

BRIDGES.—The first pier on the S. side of the Bridge of Spain was partly carried away by the flood of July 13th and 14th 1904. The masonry was washed out along the face of the pier for nearly ⅔ of its length and into the pier for about 12′ and for a depth of 25′. This necessitated closing the bridge, foot traffic only being allowed to pass on the west side. The work of building a cofferdam preparatory to repairing the pier was commenced July 14th and carried on night and day until completion. The cofferdam was completed August 1st and the water pumped out. A great deal of trouble was experienced, however, before the dam could be made tight, as the water seeped through from the bottom of the river. The leaks were finally stopped and 475 cubic meters of concrete installed in rebuilding the pier.

The total cost of the repairs, including repairs and examination of the adjoining piers by a diver and the rebuilding of a portion of the retaining wall adjoining the bridge, amounted to ₱14.671.87.

J. G. White & Co. repaired the foundation and the arch to the Jolo Bridge in connection with the repairs to their portion of the bridge for the street cars. The cost of the repairs, outside of the track area, and which was paid by the city, amounted to ₱4,329.50.

General Repairs made to bridges during the year:—

Location.	Class of repairs.	Cost.
Santa Cruz Bridge over Pasig River	Scraping and painting.	₱2,465.67
San Andres, Malate	Repointing and facing up wall	317.95
Jolo Bridge	Building guard rails	420.10
Ayala Bridge	Repairs to floor and ironwork	872.13
San Antonio Abad Bridge	Repairs to arch	795.45
Bridge of Spain	Building new walk (523 square meters sidewalk and 261 linear meters curb)	5,682.88
Blanco Bridge	Raising walks	1,608.42
	New bridge, 60 by 16 feet, of Oregon pine	751.66
Pandacan Bridge	Cost of minor repairs on 55 bridges and 17 culverts, including an inspection of all bridges within city limits	10,756.27
Total		23,671.53

Dredging Esteros.—The work of dredging the Binondo Canal from the Blanco Bridge to the Jolo Bridge so as to give a depth of 1 meter at low water was commenced in December and completed in May. The material removed amounted to 6,456 cubic meters and cost ₱4.341 55, or an average of ₱0.67 per cubic meter placed on the bank of the estero. This cost includes all repairs made on the dredge, some of which were alterations that should be figured over a longer period than the one in which the dredge was in use. The actual cost of dredging in mud (excluding the general repairs referred to) and placing the material on the banks of the estero amounted to ₱0.27 per cubic meter. The cost of dredging in clay and gravel ranged from ₱0 63 to ₱1.05 per cubic meter. The cost of loading and hauling this material for a distance of a mile for filling on streets amounted to ₱1.36 per cubic meter, or the cost of the material in place, including dredging, amounts to -P-1.99 per cubic meter. The most important estero, after the dredging is completed in the Binondo Estero, is the Reina Estero. By dredging this estero it can be made the main line of communication with Tondo from the bay. The country adjoining the estero is sufficiently low, so that all the dredged material can be used for filling and thus reduce the cost of handling the material to a very low figure. It is proposed to use the city dredge in this estero during the coming year, and by using the dredged material for filling it will be possible to remove 100 cubic meters per day.

Blanco Bridge Wood-Block Paving on 6-Inch Concrete Foundation.—The following work was performed during the mos. of January and

PASIG RIVER WALL CONSTRUCTION, REAR OF INTENDENCIA BUILDING; THIS WALL HAS BEEN COMPLETED

February:—Total area paved, 446.69 square meters, at a cost of ₱3,573.34 or ₱8 per square meter. The item of cost per square meter is as follows:—

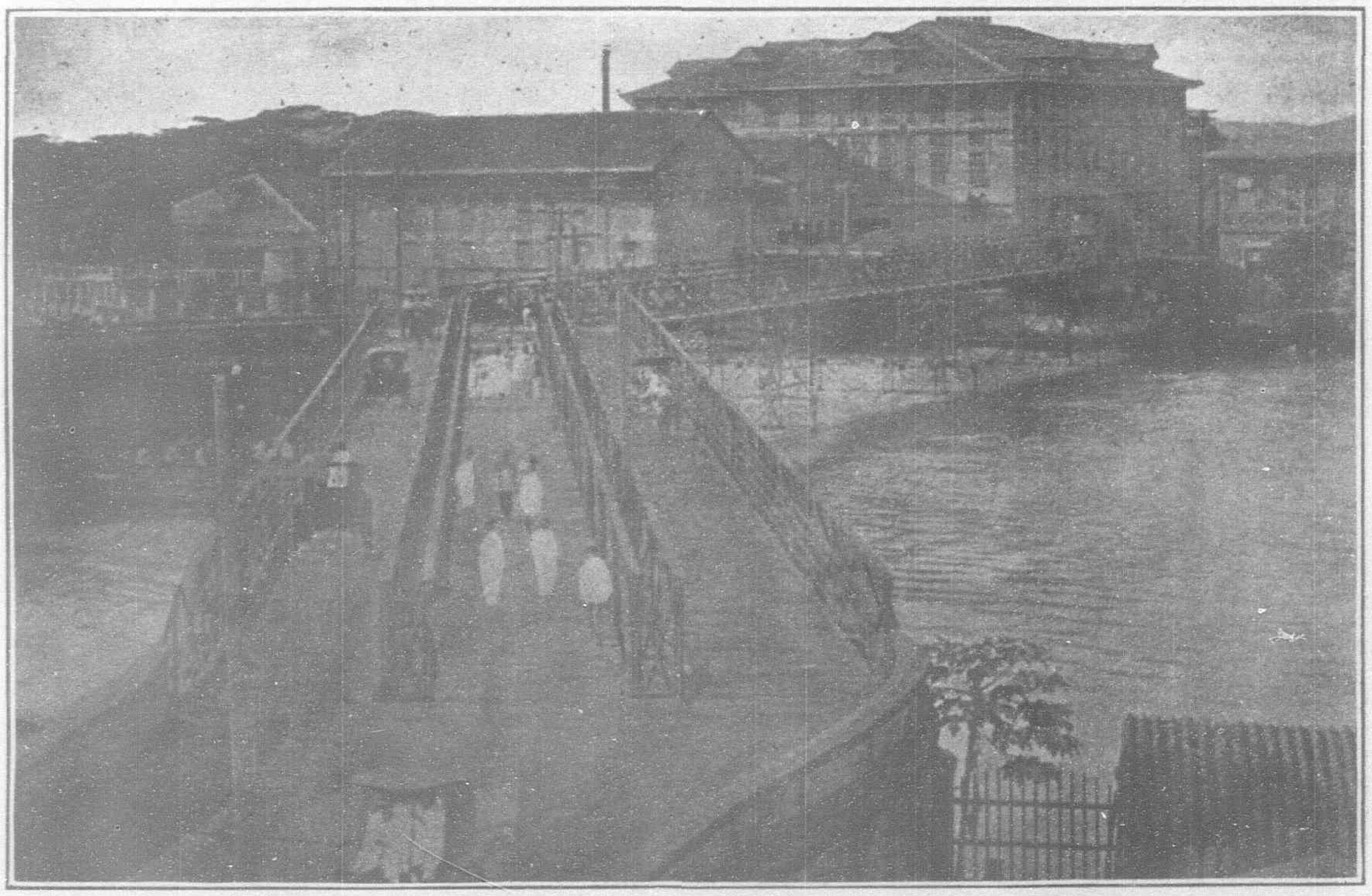
	Per square meter.
Preparing foundation, at ₱1.58 cubic meter	₱0.40
6-inch concrete foundation (1:2½:5)	1.32
Wood blocks (62 per square meter)	5.39
Laying	45
Sand cushion	.09
Pitching	.39
Total for completed pavement	8.00

Earth Filling.—The following contracts for filling streets were completed during the year:—

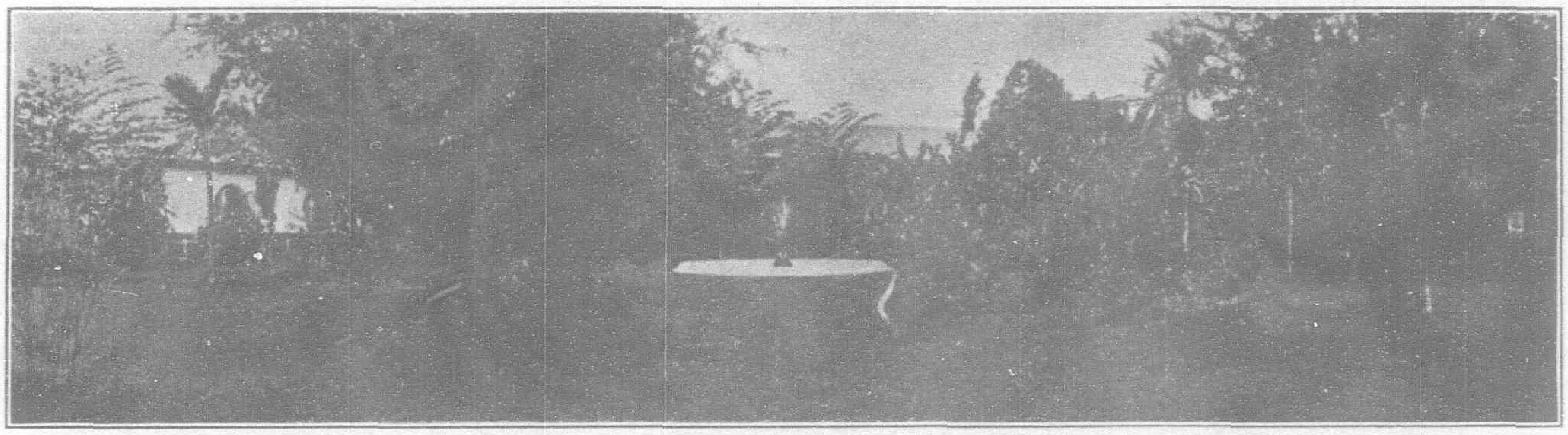
Location.	Contractor	Cubic meters of filling.	Price per cubic meter	Total cost
K Street	Lack & Davis	3,572 50	₱1.20	₱4,287 .00
K Street	Reich & Rosenburg	4,841	1.50	7,261.51
San Lazaro	S. M. Berger	5,495.65	2.00	10,991.32
Total				22,539 .83

Electric Railroad Construction —The excavation and changing of grades in connection with the installation of 30 ms. of track for the new electric road increased the work on the streets where these tracks were laid to such an extent that all work in other streets had to be abandoned. In some of the streets in Tondo the grade was raised very near a meter, necessitating a large outlay for filling and resurfacing before these streets were made passable. In most every istance the depth of road metal was not over 6 ins. The reason for this light coating of stone was due to the necessity of making each street passable in the shortest possible time and to the lack of broken stone, owing to the large amount of work on hand. It is proposed to go over each of these streets during the current yr., excavate the material to a depth of 40 centimeters, and install road material in place of the softer material excavated. It has been found that this depth of material, although costing more in the first place, is more economical in the end.

Permanent Paving.—The enormous expense of maintaining a macadam road on some of the streets having heavy traffic makes it imperative that some system be adopted whereby a certain amount of permanent paving shall be installed each year. When it is realized that the cost of maintaining a macadam roadway in such heavy traveled



OLD AYALA BRIDGE, WHICH IS NOW BEING STRAIGHTENED BY THE ATLANTIC, GULF AND PACIFIC COMPANY AT A COST OF ₱129,726 TO THE CITY



LAWN AT PUMPING STATION, SANTOLAN

streets as Calle Echagüe amounts in 6 yrs. to a sum sufficient to install a wood-block paving on a concrete base, whose minimum life will be not less than 25 yrs., the necessity of such a pavement as a sound investment is apparent. A permanent paving will practically do away with the mud nuisance, the cost of cleaning will be reduced 50 per cent, and the paving from a sanitary point will be greatly increased in efficiency. The cost of installing the permanent paving on the main streets of the city having heavy traffic will amount to approximately ₱500,000. It would seem that the best method of providing funds for this work would be to issue paving bonds in a similar manner to that used in providing funds for the water and sewer construction.

Classification of salaries and wages of street construction and bridges for the fiscal year ending June 30, 1905:—

Classified employees.

Month.	Street construction.	Bridges.	Quarry.	Launches.
1904				
July	₱1,866.66	....	₱200.00	₱880.00
August	1,894.00	₱200.00	200.00	880.00
September	2,010.00	200.00	200.00	580.00
October	2,370.00	200.00	200.00	880.00
November	2,210.00	200.00	200.00	812.00
December	2,197.66	200.00	200.00	832.00
1905				
January	2,073.34	200.00	200.00	870.00
February	2,497.76	200.00	200.00	880.00
March	2,291.98	200.00	200.00	880.00
April	1,785.66	200.00	200.00	880.00
May	2,094.44	200.00	200.00	880.00
June	1,940.00	200.00	200.00	880.00

1904					
July	₱13,220.75	₱3,067.00	₱3,696.50	₱5,297.90	....
Aug.	15,280.25	3,764.00	4,291.00	4,653.50	....
Sept.	13,610.75	6,694.45	3,904.50	3,959.00	....
Oct.	11,612.35	1,976.20	4,977.00	3,924.50	....
Nov.	11,148.55	1,255.20	3,378.10	3,768.00	....
Dec.	11,777.45	1,682.20	3,827.80	3,988.10	₱226.00
1905					
January	9,567.00	1,972.40	3,591.60	3,909.60	313.50
Feb.	8,532.15	1,749.30	3,374.40	3,556.80	284.80
March	9,676.70	1,766.30	3,815.90	3,972.60	326.20
April	8,028.80	1,083.40	3,067.80	3,870.00	308.00
May	8,589.95	958.90	3,374.40	3,938.70	334.60
June	8,262.98	960.45	3,309.90	3,959.40	339.60
Total	128,307.68	26,929.80	44,608.90	48,798.10	2,132.70

Classification of general expenses street construction and bridges for fiscal year ending June 30, 1905:—

Cost of material obtained from Insular Purchasing Agent	₱140,465.02
Cost of hired transportation	52,420.01
Hire of diving apparatus, etc	1,537.50
Repairs to Jolo Bridge	4,329.50
Purchase of sand and gravel	22,335.18
Repairs launches, barges, road rollers, quarry, etc	17,706.52
Filling for K Street and San Lazaro	22,539.83
Total for general expenses	261,333.56
Total salaries and wages	291,051.28
Grand total	552,384.84

Includes purchase of paving blocks for Escolta, purchase of crusher, and purchase of miscellaneous tools and material for bridges.

Summary of work performed during the year:—

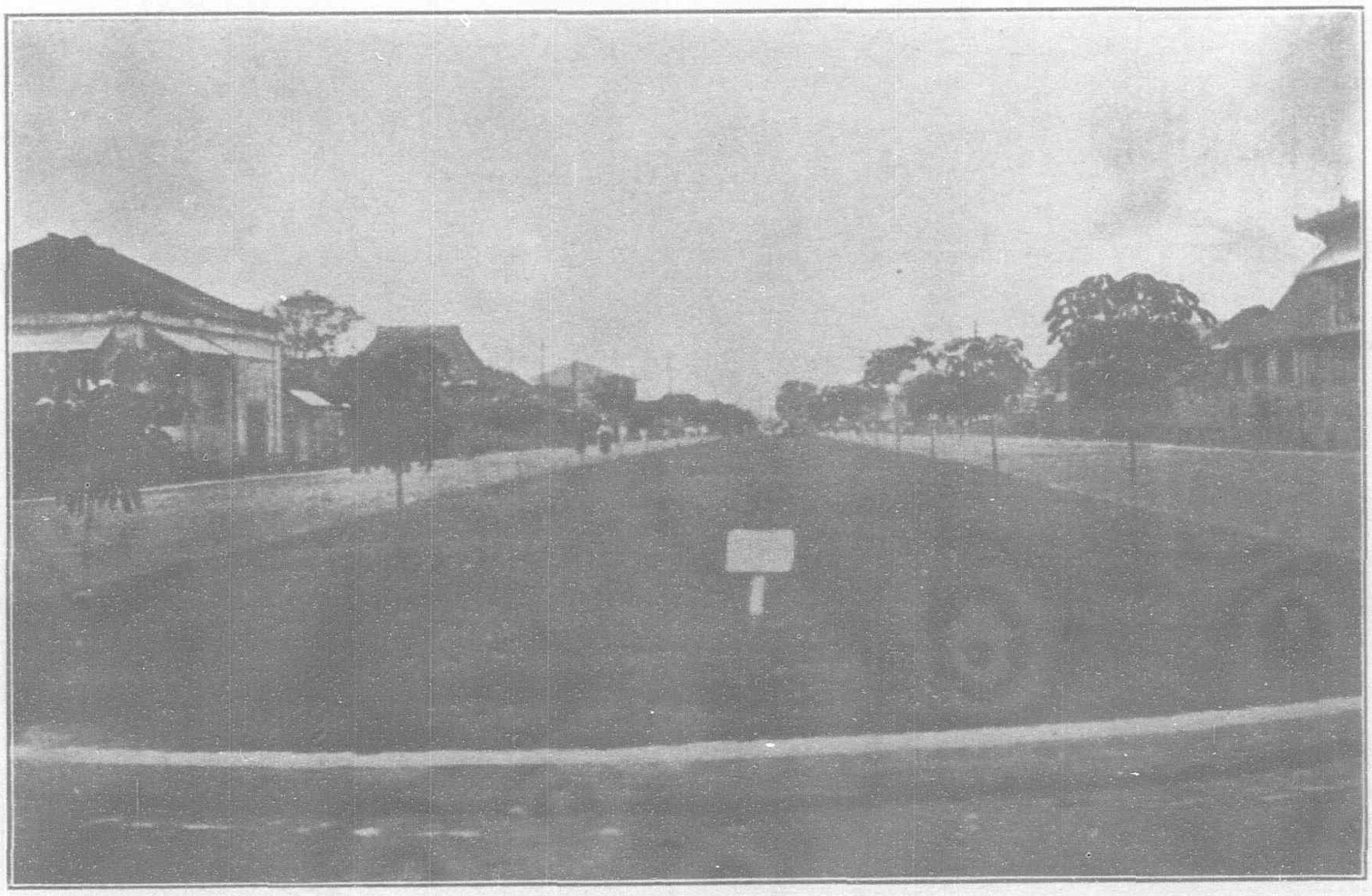
Streets resurfaced	square meters	₱282,523
Streets graveled	do	100,213
Streets patched	do	153,931
Block paving laid	do	6,192
Cement curb laid	linear meters	11,193
Gutters laid	do	31,713
Cement sidewalk, laid	square meters	10,708
Filling	cubic meters	31,010
Street signs made	number	360
Sidewalks, notice served	do	721
Permitsissued	do	1,879
Broken stone from quarry	cubic meters	49,211
Gravel purchase by contract	do	19,479.06

FIRE OPERATIONS DURING FISCAL YEAR 1904-05, IN MANILA

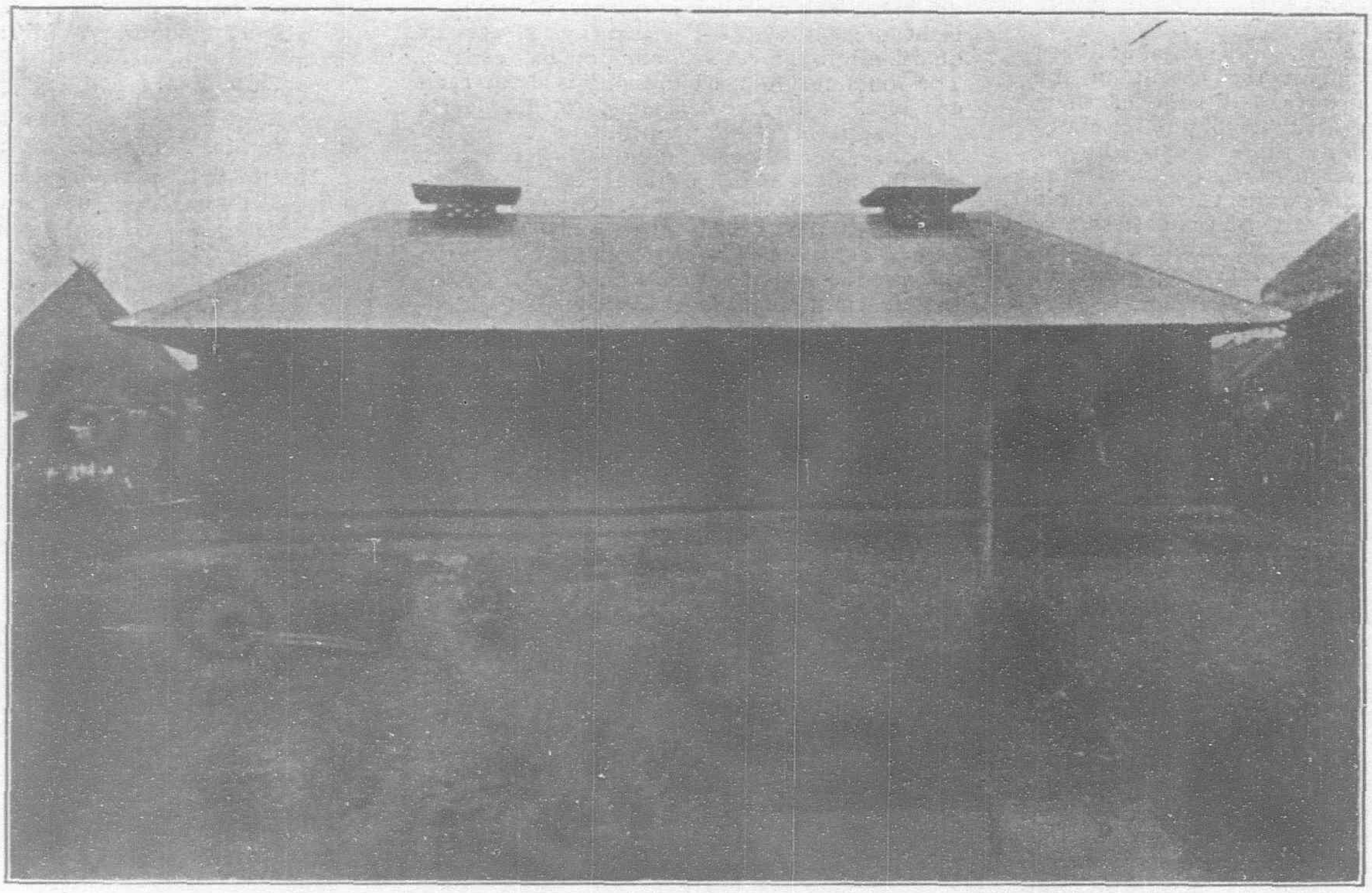
Mr. Lewis H. Dingman, chief of the Manila Fire Department, discusses fire operations in Manila during the fiscal yr. 1904-05 in his annual report to the Municipal Board.

During the yr. there were 132 alarms of fire, which is an increase of 31 alarms over the previous yr.

"It is a matter of regret," says Chief Dingman, "that, although there is a local association composed of the fire underwriters, it is impossible to obtain fire-insurance statistics of a reliable nature. The natives and a great many other owners and occupants of buildings burned show a great reluctance to give any information regarding the amounts of insurance carried and the losses adjusted. In a great



MORIONES PLAZA IMPROVED, 1905



A MIDDEN SHED

many instances the cause of fire can not be ascertained, apparently due to fear.

"A number of alarms were turned in by natives during the year, thus showing that they are becoming cognizant with the fact that the fire-alarm boxes are placed throughout the city for the protection of their property, and that it is not necessary to first notify a police patrolman. This is evidently due to the notices (printed in Spanish, Tagalog, Chinese and English) which the firemen keep posted in the residences. These notices give explicit instructions as to how to turn in an alarm from a box and also give the location of the box nearest their residence."

Mr. Frank Moffett, deputy chief of the department and city electrician, reports that the fire alarm system worked perfectly during the year. Fifty-five alarm boxes were installed and the location of 12 old boxes changed. The police alarm system has also given entire satisfaction. Twelve police boxes were installed and the location of 9 changed. One hundred and six additional boxes are now being installed.

NEW TELEPHONE SYSTEM, MANILA

Indications are that the new telephone system for Manila will be completed and in operation by September of the current year. Under the energetic and thorough-going supervision of its manager, Mr. H. Thurber, C. E., the Manila Construction Company has already practically finished the underground conduit work to conform to the first plans of the telephone company. The reinforced concrete central station will be ready for occupancy, it is expected, by March 1st, and then will commence the installation of the most complete and modern telephone-operating apparatus in the Orient. And in this connection a few details of this new enterprise may be interesting.

Early in March, 1905, Mr. E. C. Gee, a telephone engineer, arrived in Manila to make preliminary studies of a telephone and telegraph system to be installed in the City of Manila and the Island of Luzon. These studies proved satisfactory, a franchise was applied for, and in July, 1905, was granted by the United States Philippine Commission. Then a company composed of prominent San Francisco capitalists was formed, known as the Philippine Islands Telephone and Telegraph Company, and Mr. Gee was made general manager with headquarters in Manila. Mr. W. H. Gallaher, formerly telephone engineer of the Pittsburg (Pa.) Bell Company, was placed in charge of engineering and construction.

Taking advantage of the early mistakes made in the United States in such work, the new system was planned on a very broad and comprehensive basis. Studies were made showing the character of buildings in every city block, statistics gathered covering census records for many years past, and a carefully calculated rule adopted from which a close estimate could be made of the probable telephone subscribers in each city block in 1920. This done, it remained only to plan an ideal telephone plant to supply these prospective subscribers.

The company, at this point, faced a serious financial problem. Here was a city of 250,000 inhabitants, or more, containing only 500 telephones, or only one 'phone to every 500 people as against one to every six people in San Francisco and other Pacific Coast cities of the homeland. The question was, whether to build a medium-sized plant—say for 3,000 telephones—which might possibly have to be thrown into the junk pile in a few years, or to invest a large sum at once in a plant capable of expanding to the largest size. The latter course was chosen, and a plant begun which by simply building additional units can be enlarged to contain 30,000 telephones.

The telephone center, after the completion of the surveys, happened to fall right near the present postoffice, so a site immediately adjoining was leased for 50 yrs. from the insular government, and the contracts let for a commodious building large enough to house the "hello" apparatus for the ultimate of 30,000 instruments. The switchboard at the central station is to be the latest improved common-battery, lamp-signal style, manufactured by the Western Electric Company, and exclusively used by the Bell companies in the United States. This board is made up of units, these units being the largest size manufactured.

Considering the number of telephone contracts already obtained, a very extensive system of underground conduit proved necessary for efficient and reliable service. The vitrified clay conduit used in America was not available here, the freight, duty and breakage rendering the price prohibitive, so a contract was let to a local concern to manufacture 80,000' of rich cement. These duct are laid in concrete in the usual manner, and standard manholes provided every 400' or less. The underground cable is the standard dry-core, lead-covered, low-capacity cable of the most modern manufacture.

The pole question was a very serious one. Forestry laws and lack of transportation practically forbade the use of native wood, and almost all the ordinary woods of commerce are extremely subject to the depredations of white ants. These insects in 6 mos.' work on an 18" spar of best Oregon pine will so ravage it that it will break of its own weight. The City of Manila, about 3 yrs. ago, installed a number of red cedar poles of special specifications brought from Puget Sound. These poles have, thus far, successfully resisted white ants, and as a consequence, this wood was adopted by the telephone company.

On account of typhoons, and for other considerations, the amount of open wire will be kept to a minimum, and short poles carrying lead-covered cable will be substituted.

LAST OF THE STEAMER "CARLISLE"

Reports from Saigon are to the effect that on January 3d fire broke out on board the steamer *Carlisle*, while she was lying at anchor in the Saigon River. The fire started in the No. 3 hatch where smokeless gunpowder was stored, and from there quickly spread to No. 4 hatch in which was stored the shells and explosives which the vessel took on board more than a yr. ago at Vladivostock for the Baltic Fleet. The shells exploded with terrific force and deafening noise, one report being so loud that it could be distinctly heard a distance of 10 ms. from where the ship was lying, and afterwards fragments of shells were picked up on the beach. After the explosions the ship settled down in the water and all that is now visible of her is the forecastle, the stern being entirely submerged. Of the crew all have been accounted for except the 2d engineer, but three others are in hospital suffering from injuries sustained. The heat of the fire was so severe that the members of the crew could not save their personal belongings. The vessel is a total loss being practically riddled with holes.

QUEER RAILROAD ENGINEERING

Some queer engineering practices have been indulged in throughout the Orient in the construction of railways, but none of them which have been brought to public notice surpasses in simplicity those adopted by the engineers who have "thrown together" the Sungei Ujong Railway, which traverses a route from Seremban to Port Dickson (formerly known as Lukut), in Negri Sembilan, Federated Malay States. The line was opened in July, 1901, and, according to one authority, "has greatly facilitated trade." Mr. J. S. Pasqual, however, forgets to say anything about "trade" in a description he writes of a trip he recently made over the road. He devoted himself almost exclusively to the engineering features of the line, and here is what he has to say:—

A few words about the S. U. R. (short for Sungei Ujong Railway) would not be out of place here, as it is one of the two main routes to Lukut. This line, about 25 ms long, is owned by a company and is wavy, up and down, and curly. It is a moot point whether there are 149 curves on it or 150; but what is certain is that the curves are joined on one to the other like a lady's ringlets released from the curling pin, or, as the genial manager aptly puts it, "One good turn deserves another." You can't help knowing when the train is taking a curve by the way you are rocked about in the carriage. And well do I remember how I was once amused by the way two little boys kept racing from one side of the carriage to the other, according as it listed to port or starboard, in order to catch sight of the locomotive as it came into view in taking the starboard or port tack. It is not true that passengers sometimes have to get out and push the train up an encline, as, in point of speed, it compares favorably with other Federated Malay States railways, doing the 25th m. in 1½ hrs. As your fare costs $1.50, this works out at $1 per hr. only. Sometimes it works out at 50 cts. per hr. Then you have the comfort of knowing that you are getting your money's worth travelling—and sleep. The S. U. R. has good points. For instance, you are not told by a brass plate what to do in regard to the disposal of your lower anatomy with reference to the upholstered seat. Then again, you are not set rummaging your pockets and vocabulary by the guard at every station, in order to satisfy his insistent curiosity as to the color of your ticket, and whether he has sufficiently mutilated it with the pair of nippers he sports and snaps so perilously near your face. The S. U. R. guard knows better. There is one thing, however, you must not do on the S. U. R. and that is to leave the fore door of your carriage open, because the locomotive is a veritable spitfire, and is likely to treat you to a bigger display of fireworks than you care for. A notice to this effect is put up near the door.

The principle that must have guided the engineers when constructing the S. U. R. was apparently to follow the line of least resistance, and so avoid cuts and banks. The sight of a small hill was sufficient to send the line meandering all over the country in order to get to the other side of the hill. In the same way, it would loop an entire watershed to get to the other side of a gully, be it ever so small.

MINERAL RESOURCES OF KOREA

The London Board of Trade recently received, through the British Foreign Office, from Sir J. Jordan, K. C. M. G., minister at Seoul, a translation of the report of the Commercial Bureau of the Japanese Government on mines and mining in Korea. The following extracts from this report will indicate generally the mineral resources of the country, but Minister Jordan points out that the figures embodied in them are not in every case accurate:—

The mineral output of Korea may be considered to consist practically entirely of gold which is recovered both by placer or quartz mining. The number of places where gold is at present worked, either by placer or quartz-mining methods, amounts to over 120. The amount produced annually is about 121,000 ozs., of a value of some £450,000. Quartz gold appears most plentiful in Pyeng-An Province, the Wonsan mine being the most valuable in the country. The next in importance is the Eun san mine. Other valuable mines are the Chang-song and Tel-chon. Placer gold occupies the principal place in the products of the peninsula, and the mining districts are more widely distributed than those of the quartz mines. Of the total gold output of £450,000, the proportion of placer gold amounts to some £300,000, or 66 per cent of the total. The principal centers of placer mining are situated in Pyeng-An Province, the whole annual output of this province being about 48,000 ozs., of a value of over £150,000, or ⅓ of the total output of gold in the country.

In spite of the demand for silver in Korea, there is no native supply. There are, however, silver mines in the country. Experimental workings have been made, and it appears that there are undoubtedly silver deposits. Owing to the expense of working, however, they offer far more difficulty in working profitably than gold mines, and especially than placer gold.

Copper occurs chiefly in the N. and S. of the peninsula, and is rarely found in the central districts. The principal mine in the country is that of Kap-san, in Ham-Gyeng Province, which has a considerable output, amounting to some 270,000 lbs. of refined copper per annum.

Iron is found in Whang-Hai and other provinces, but the difficulty and expense of mining and smelting have hitherto precluded the Koreans from engaging to any great extent in this industry.

The future of the coal mining industry in Korea does not look promising; there are, however, coal deposits in several places. Of these deposits only that at Pyeng-Yang consists of smokeless coal all the others being bituminous, and though some of the deposits are of considerable extent, the quality is not very good.

Crystal is a famous product of Korea. It is found principally in Kyeng-ju, in North Kyeng-Sang Province, and is of excellent quality. Talc of excellent quality is found at Pyeng-hai, in Kang-Won Province, and in the neighborhood of Yee-Chun, in Kyeng-Kei Province, but it does not appear ever to have been worked.

PROPOSED NATIONAL HARBOR, JAPAN

That the Japanese are a far-seeing race is shown by the way they build for the future. The Japan *Chronicle* deals with the determination of the Japanese to have a large harbor that will rival Shanghai, Hongkong, or even large western cities. Mr. Takugaro, a leading citizen of Osaka, thinks it is time for Japan to move forward. He points to the work in the past of Europeans and Americans in building up trade on the Atlantic, and contends the same thing is possible on the Pacific. America, China, Japan, India, and Australia are the lands visibly interested in the era opening in the Orient and on the Pacific.

The country or countries favorably situated for trade, he says, are sure to be benefited by every movement forward. Japan is already doing businesss with the principal countries on the Pacific, and is eagerly looking forward to the time when it will be able to extend its trade into all parts of the world. To do this, it will need facilities for handling, forwarding, receiving, and transporting goods. Panama, Mr. Nakahashi thinks, is to be the leading port on the Pacific, followed in importance by San Francisco, Seattle, Vancouver, and Portland. No important port is possible on the South American Coast, for geographical conditions will not permit it. In Asia Hongkong, Shanghai, Osaka, Manila, and Dalny are to be the ports, and important in the order indicated. All of these are capable of being improved and doubtless will be as trade increases.

Discussing the relative advantages of the several principal commercial ports of the Orient, Mr. Nakahashi says:—

Manila will not, despite the desires and efforts of Americans, develop into a first-class tradal port owing to the fact that, apart from the torrid climate, it has neither factories of importance nor a large field for inland trade, while, as an intermediate port for China, Japan, or Korea, the distance is too great and fuel too dear. The same may be said of Dalny to a certain extent, with the only exception in its favor that as a terminus of a 500-m. railway mails and a certain class of travelers will pass through the place. But so long as railway freight can not successfully compete with steamships, and eastern Siberia and northern Manchuria remain more densely populated than southern Manchuria, Dalny will remain a second-class tradal port. It is therefore only Hongkong, Shanghai, and Osaka which possess qualifications that will enable them to develop into important commercial emporiums in E. Asia.

The shortcomings of Hongkong are that, being an isolated island, its scope is necessarily limited; it has no manufactures to speak of, while the sphere of island trade is confined to the neighborhood of Canton. Although Hongkong may continue a chief distributing center of European trade, its position is not suited to be a large mart for Pacific trade in the future. Shanghai is better situated than Hongkong in having millions of people in the Yangtsze Valley, many factories in its vicinity, while it has a favorable position as an intermediate station. Its only weak point is that the harbor is not as deep as it should be for a large commercial port, and this fact greatly discounts the possibility of its becoming a port of much greater importance than at present.

Osaka, on the other hand, not only is situated on the highway of the world's commerce, but its position is unique as a distributing center for China, Korea, and the South Sea Islands. It possesses within easy reach many factories turning out articles for export, while in the matter of domestic trade it covers an area containing two-thirds of the total population of the country. For fuel the coal fields in Kyushu will give a practically unlimited supply across the water some two hundred and odd miles in extent. Osaka has already laid the foundation of becoming a great harbor, and if the breakwaters are farther extended so as to keep a depth in the harbor of 35′ it will become a port possessing as nearly as possible all the essential elements of a large commercial emporium in the Pacific.

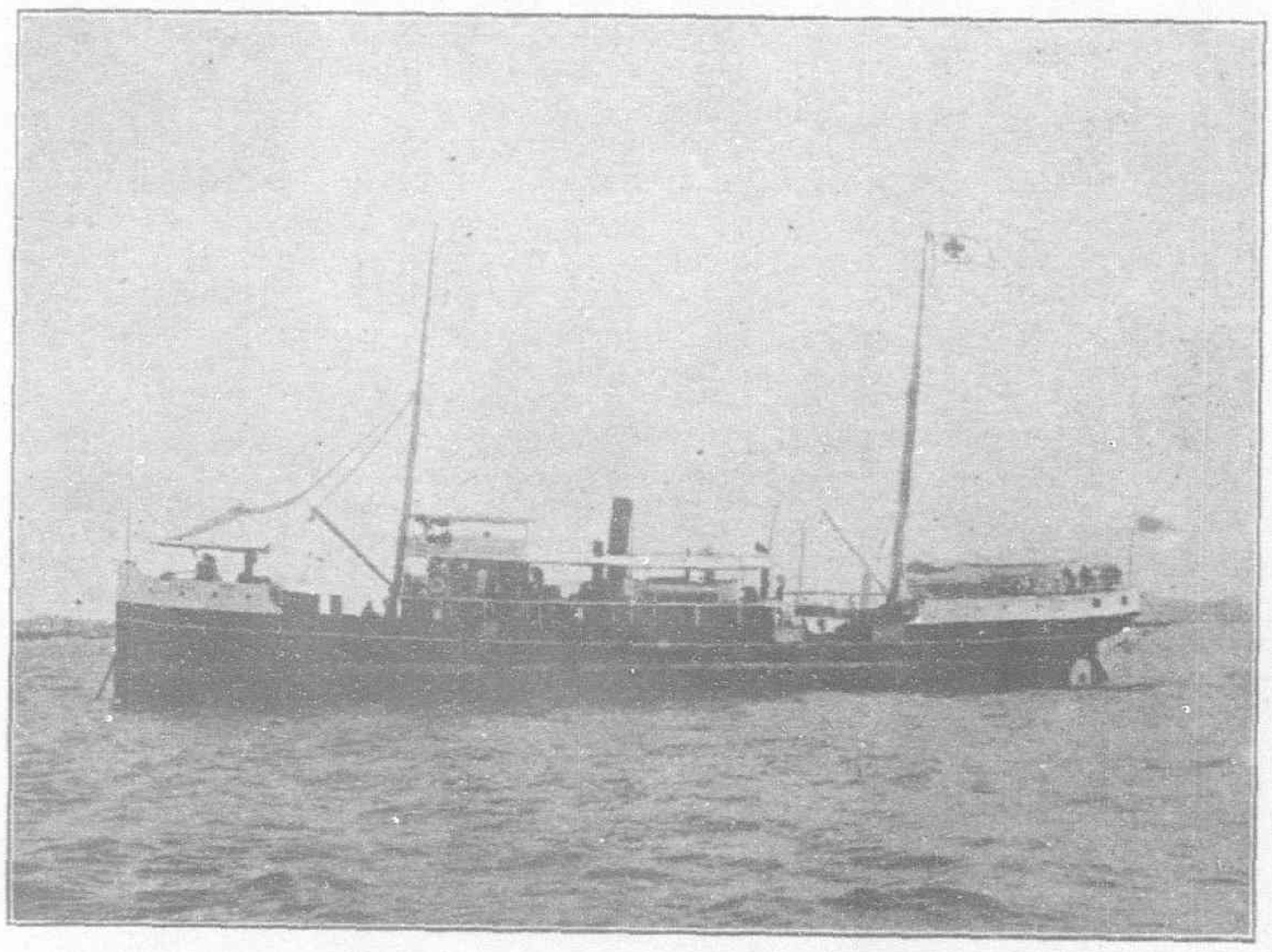
PHILIPPINE MARBLE AND CLAY

Marble, or crystalline limestone, occurs in the Islands of Romblon and Mindoro, and probably elsewhere in the group. This is a gray-blue mottled marble and much of it seems very suitable for decorative use. White crystalline marble has also been found in Mindoro, in considerable quantity.

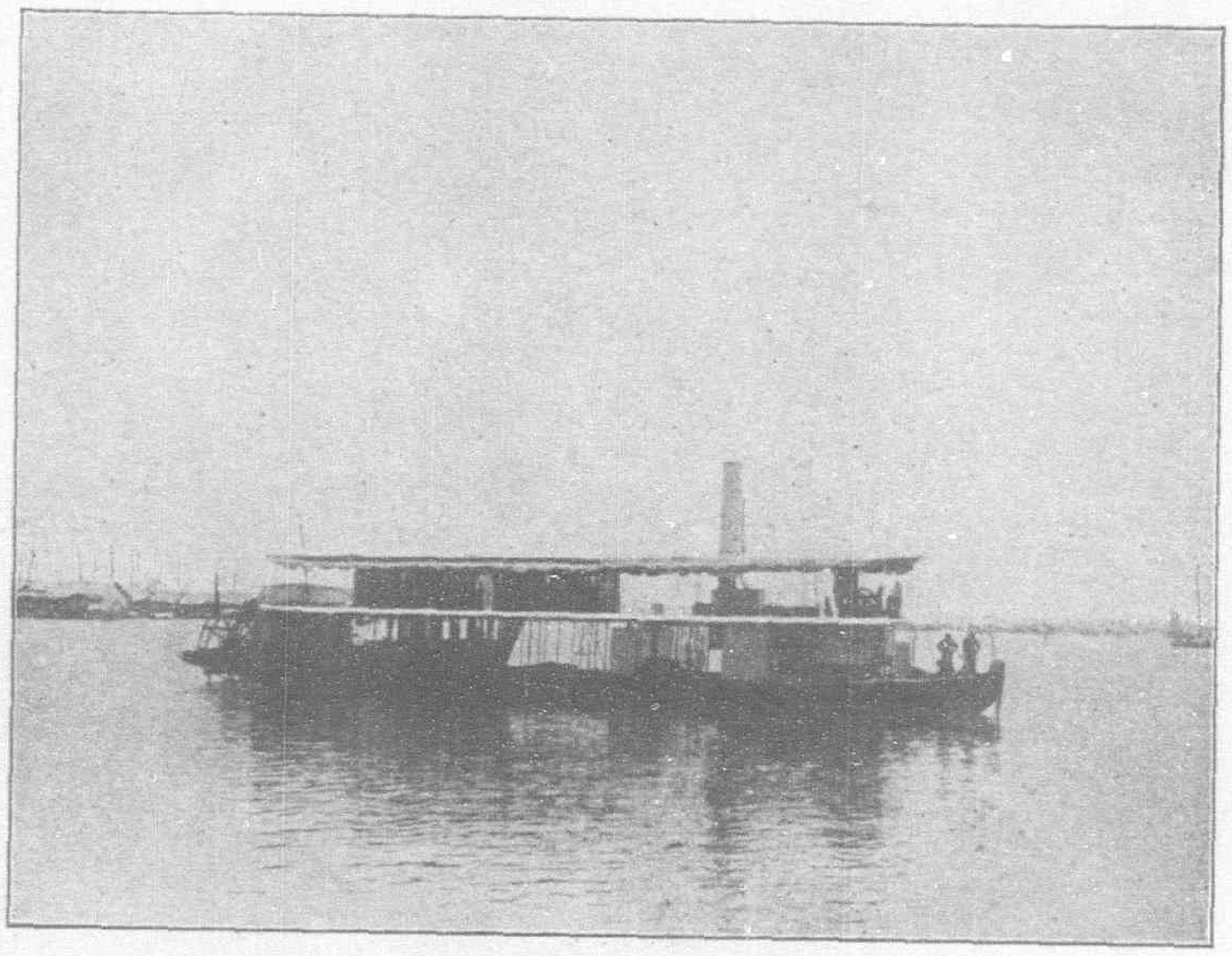
White clays, or kaolin, have been found in the Provinces of Abra, Camarines, Ilocos Norte, Antique, Benguet, Cagayan, Isabela, Laguna, Marinduque, Masbate, Pampanga, Pangasinan, Albay, Romblon, and Zambales. The suitability of these for the manufacture of porcelain and china is now being investigated. Red clays, from which natives make large amounts of pottery for local use, are found in almost every province in the Islands. Fire-clay has been found in the coal beds, and may afford a profitable industry in the future. Red bricks are made in large quantities in Bulacan, Capiz, Rizal, Ilocos Norte, Isabela, Marinduque, Masbate, and Pampanga.

Messrs. Riley, Hargreaves & Co., Ltd., Singapore, S. S.

In this connection THE REVIEW presents some fine illustrations herewith of vessels that have been turned out at this shipyard.



PASSENGER AND CARGO STEAMER *PERAK* (90 A-1 AT LLOYDS), BUILT FOR CHINESE OWNERS; LENGTH 164′; CARRYING CAPACITY 570 TONS D. W., PASSENGERS 1ST CLASS 14, 2D-CLASS 32, 3D-CLASS 155



STERNWHEEL STEAMER *OGAN*, BUILT FOR THE "KONINGKLIJKE PAKETVAART MAATSCHAPPIJ"; LENGTH OVER ALL 100′; DRAUGHT OF WATER 1′ 10″; CARRYING CAPACITY 26 TONS D. W., BURNING OIL FUEL

Among the old-established and successful electrical, mechanical, and civil engineering firms of the Far East, that of Messrs. Riley, Hargreaves & Co., Ltd., of Singapore, S. S., holds a foremost place. The head offices and works of this concern are located in Read-st, while its town store occupies spacious premises at 13 Battery-rd, Singapore. The firm also has a branch at Ipoh, Perak, Federated Malay States, and is widely represented throughout these states and Netherlands India.

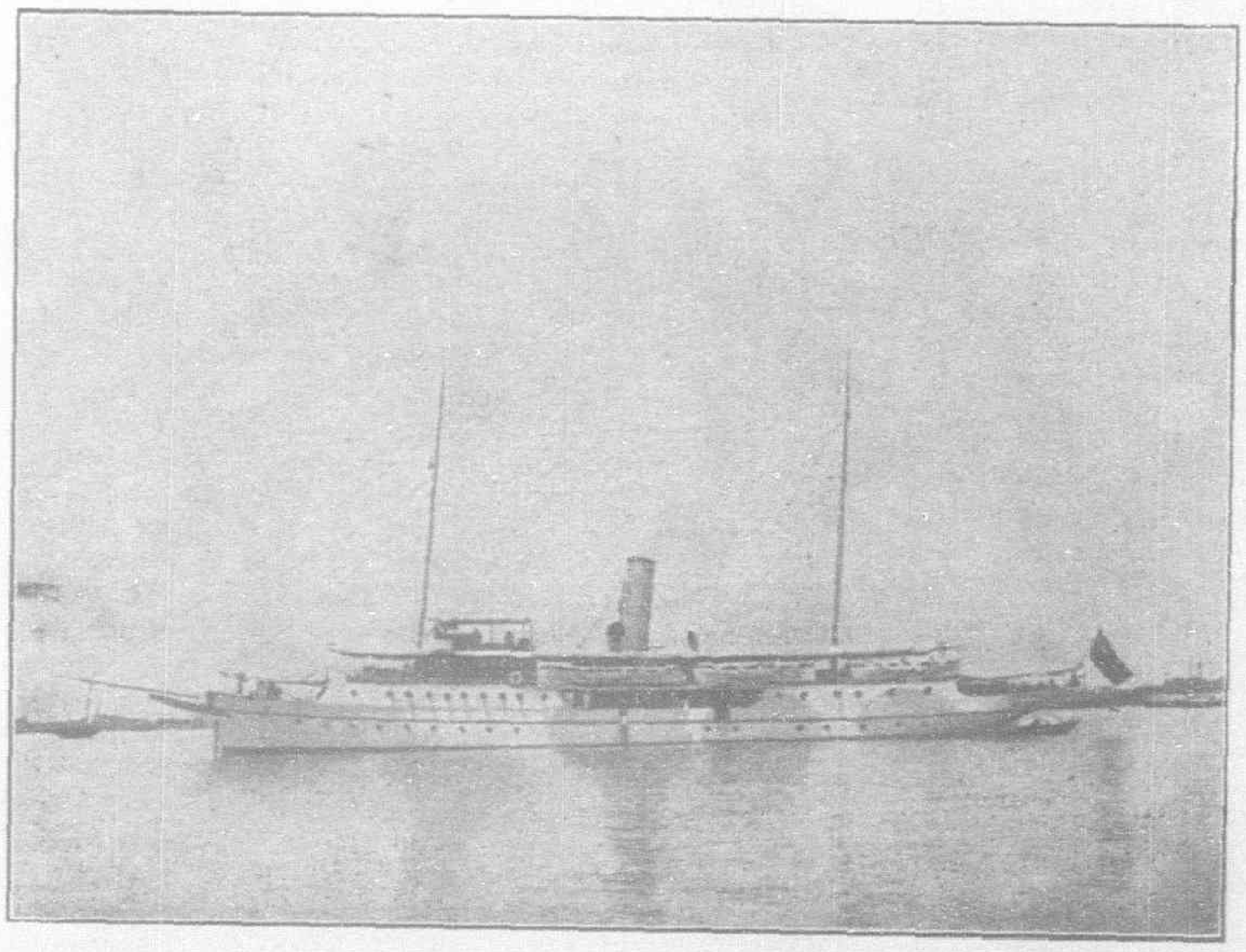
Messrs. Riley, Hargreaves & Co. carry on, besides their general contracting business, boilermaking, iron and brass foundering, and bridge and shipbuilding on an extensive scale, besides being general contractors to the governments of Great Britain (Colonial), Netherlands India, and the United States of America.

The managing director of Messrs. Riley, Hargreaves & Co. is Mr. W. M. Robertson, better known or more universally esteemed than whom there is no other gentleman in the engineering and contracting business of this part of the globe. Under his able direction the firm has grown to be one of the best dividend-paying concerns of the Straits Settlements.

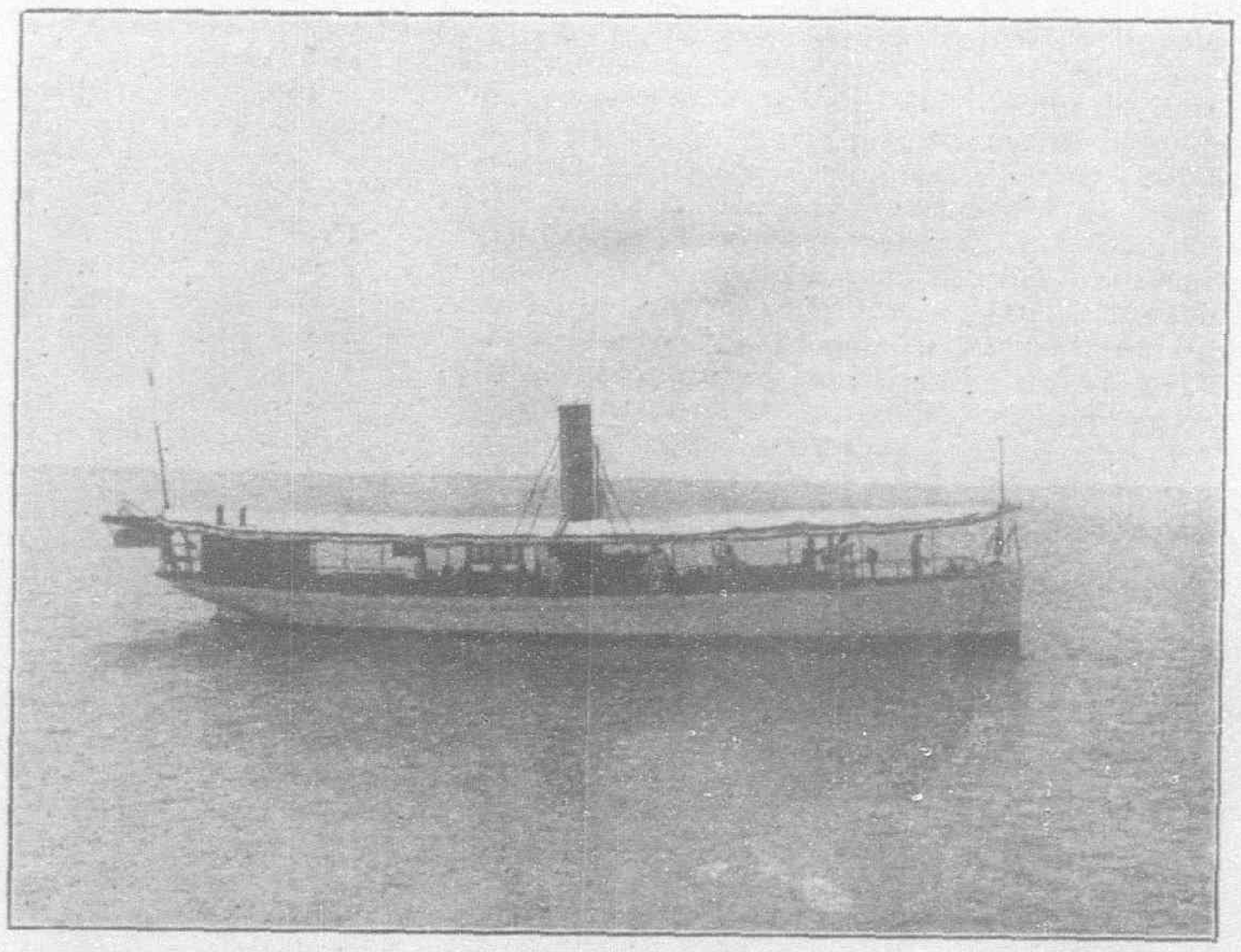
Messrs. Riley, Hargreaves & Co.'s engine works, boiler shop, and foundry are located at Kampong Malacca. The machine shop includes all sizes of lathes, planing, and shaping machines; boring, screwing, slotting, and milling machines; cold iron saws and other machines, and is capable of executing the largest orders promptly and on a moderate scale of prices. The boiler shop is a new, large, and commodious addition to the plant, and is fitted with all the most modern heavy machinery for turning out 1st-class boilers, tanks, bridge and girder work, and pipes for hydraulic mining, for the last named of which there is a constant and increasing demand. The foundry is equipped for a large output of light and heavy, plain and ornamental castings in loam, green sand and dry sand. Special facilities are provided for turning out house and godown columns and beams, bridge cylinders and heavy mill gearing, while castings in brass, copper, bronze and bell metal are also among the products.

The firm's shipbuilding yard is located at Tanjong Rhoo, and here fine vessels are built under Lloyd's and the London Board of Trade surveys, and speeds are guaranteed. The yard is provided with large engine and machine shops and building sheds. The machine shop is fitted with powerful punching, shearing, bending, plate rolls, and plate bending and planing machines; plate and bar furnaces, and bending blocks, and is adapted for shipbuilding in steel, iron, composite or wood. Like all other departments the shipbuilding is carried on under skilled European supervision, and the firm is prepared to furnish full drawings, designs, and estimates for all kinds of steam vessels.

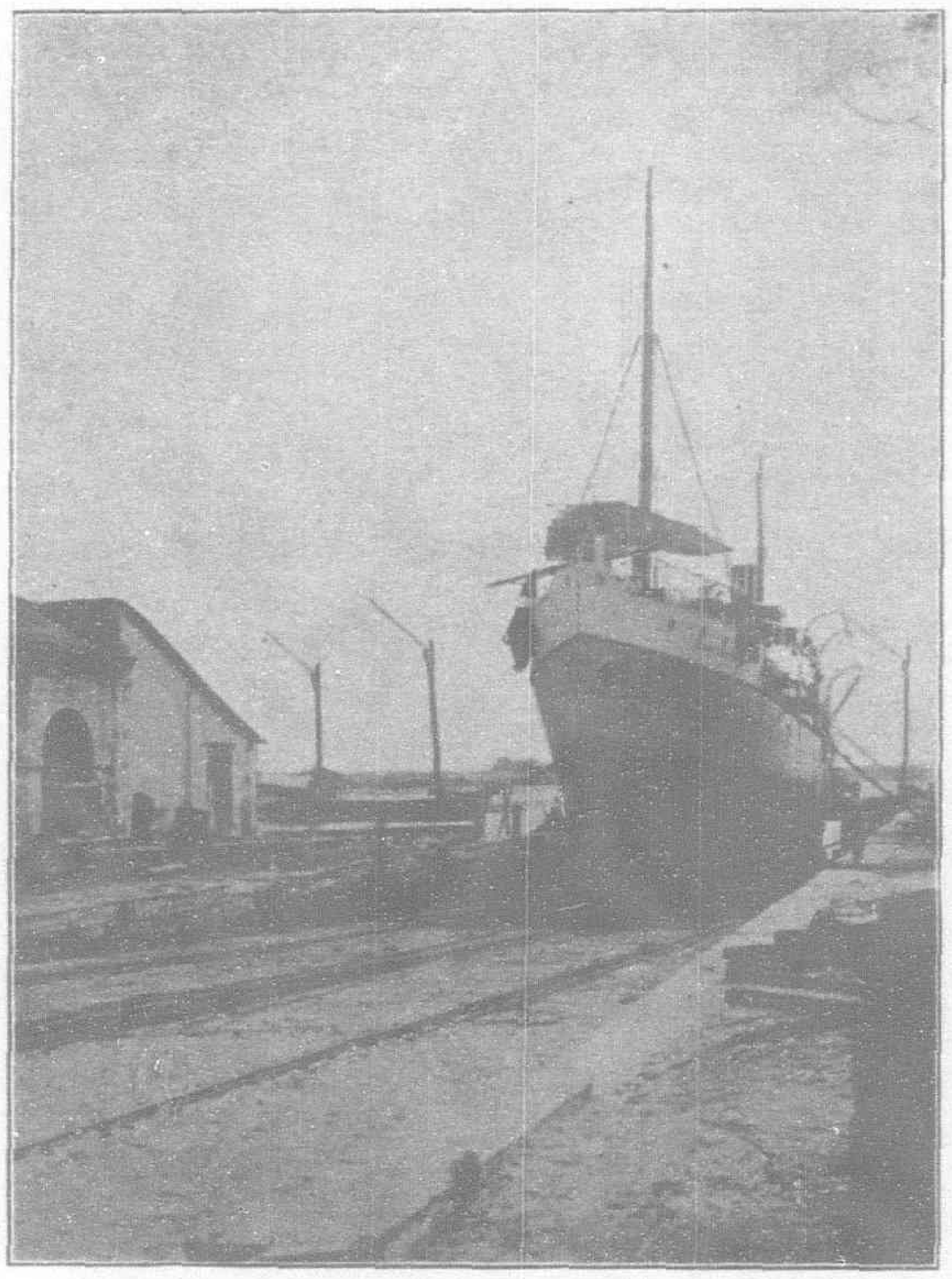
In their electrical department Messrs. Riley, Hargreaves & Co. handle continuous and alternating current machinery of every description, together with dynamos, motors, arc lamps, instruments, switchboards, etc. They also manufacture steel bridges of all classes, piers, lighthouses, land and marine engines and boilers, the "Victor" centrifugal pump, mining machinery of all classes, oil boring gear, boring tools, pug and mortar mills, brickmaking machines and presses, and watercarts, roadrollers, etc., as supplied to colonial and native states governments and municipalities.



STEAM YACHT *SEAMEW*, BUILT FOR THE GOVERNOR OF THE STRAITS SETTLEMENTS; LENGTH 197′; SPEED 12 ½ KNOTS



STEAM LAUNCH *IDRIS*, ONE OF SIX OF THIS CLASS OF VESSELS BUILT FOR THE GOVERNMENT OF THE FEDERATED MALAY STATES; LENGTH 72′; SPEED 10 KNOTS



STEAMER *CONSTANTIJN* UNDERGOING REPAIRS ON MESSRS. RILEY, HARGREAVES & CO'S SLIPWAY AT TANJONG RHU; LENGTH 107'; GROSS TONNAGE 188

The town store in Singapore contains a large stock of engineering, shipbuilding, and house building tools, materials, and stores. Steamers can be fitted out to pass Board of Trade survey with lamps, life buoys, and belts; rockets, blue lights and other signals, stamped with date of manufacture. Mining companies can be supplied from stock with boring tools, and all kinds of mining and pumping machinery. Rock drills, picks of all kinds, ore dishes, etc,; planters' changkols, parangs, spades, axes, etc., are always kept in stock and can be supplied in any quantity.

JAPANESE PROGRESS

United States Consul Sharp, of Kobé, contributes a very interesting report on various industrial enterprises that are active in Japan, most of which will shortly become competitors of similar establishments in America and Europe. He writes:—

Cotton yarns.—The spinning industry is well developed in this consular district, and cotton yarns form the principal article of export. In 1903 the daily average of working spindles was 897,119, and the output of yarn amounted to 233,789,301 lbs. Besides supplying the domestic demand, yarns to the value of $12,474,074 were exported from Kobé and Osaka in 1904, mostly to China and other Asiatic countries. No. 16 is the grade mostly exported, but Nos. 12, 14, 20, 22, and 32 are also shipped in considerable quantities.

Cotton textiles.—This industry is not yet so important as the spinning, but it is growing rapidly, and great varieties of goods are turned out. It is stated that there were 7,517 power looms and 212,211 hand looms in operation in 1903 in this district. Ten large mills in this neighborhood, operating an average of 4 640 looms in 1903, produced 76,702,213 yds. of goods. In the first half of 1905 these same mills had 5,711 looms working and produced 52,345,742 yds. Among the textiles manufactured are gray shirtings, sheetings, drills, cotton sail duck, cotton flannel, T cloths, muslins, towels, and blankets. The domestic consumption of all these goods is large, and the exports at Kobé and Osaka amounted in value to $3,937,059 in 1904. The exportation of towels alone amounted to $681,255. These goods are sent mostly to Asiatic countries. There is also a considerable manufacture of knitted goods.

Clothing.—In connection with the cotton textile industry it is worthy of note that a large quantity of clothing and underwear is made here, exports of the latter at Kobé and Osaka amounting in value to $669,106 in 1904. The importation from abroad of shirts, collars, etc., has become insignificant owing to the development of domestic manufactures.

Carpets.—Cotton, wool, and hemp carpets to the value of $245,581 were exported from Kobé in 1904. A very creditable carpet is made here and is largely used.

Clocks and watches.—There was formerly a considerable market for foreign clocks in Japan, but now most of the cheaper kinds are made in Japan. There are large factories in Osaka and Nagoya, and even watches are turned out, though sometimes made largely from imported parts. The value of clocks exported from Kobé and Osaka in 1904 was $181,508.

Umbrellas.—European umbrellas are also made in this district on a large scale. Besides supplying the greater part of the amount required by the large and growing local demand, they are exported, principally to Asiatic countries, the value of shipments from Kobé and Osaka in 1904 being $603.707. While the ribs for the more expensive umbrellas are imported from abroad, those for the cheaper grades are made here. There is also some importation of material for covering them.

Glassware.—Window glass, mirrors, and glassware of all kinds are now manufactured in this district, and in 1904 were exported from Kobé and Osaka to the value of $509,747. It is only a few years since that the supply of sheet glass came entirely from abroad, and it was thought that the article could not be manufactured in Japan. At present sheet glass, little inferior to that imported, is not only manufactured in Japan but exported to China, India, and Burma. The principal glass factory in Japan is the Shimada Glass Works, of Osaka, which employs about 400 operatives. The glass made by this factory has obtained a good reputation in China and India, and the government is doing what it can to encourage the industry by using Japan-made glass in its buildings.

Lamps.—Lamps and parts, such as burners, chimneys, etc., were formerly imported from the United States, but now all except some expensive or patented styles are manufactured in Japan and are exported to the neighboring countries. The development of glass manufactures has made the growth of the lamp-manufacturing industry much more rapid. The value of lamps and parts exported from Kobé and Osaka in 1904 was $244,225.

Cigarettes.—The government monopoly of course prevents the importation of manufactured tobacco, but in addition to having the domestic market to itself, it exports largely to Asiatic countries. The value of cigarettes shipped abroad in 1904 from Kobé and Osaka was $1,145,252. Paper mouthpieces, formerly imported from the United States, were exported to the value of $34,571 in 1904, of which about $12,000 represents mouthpieces sent to the United States.

Paper.—The manufacture of European style paper is well developed, and at present many newspapers are printed on paper of domestic make. The finer grades also are produced.

Machinery.—A great deal of the simpler kinds of machinery is already made in Osaka, and exports amounted to $285,609. Electric motors are manufactured in Kyoto and Osaka, but not over 17 h. p. ordinarily. Dynamos and other electrical appliances are also made in the district to a considerable extent. The majority of the locomotive engines are imported, but some are constructed here, usually with imported parts. Railway cars are made, the trucks being commonly imported.

Leather goods.—Shoes, and leather trunks and bags are manufactured in this district, and so cheaply that competition from abroad does not exist. The value of boots and shoes exported from Osaka in 1904 was $38,012.

Refined sugar.—This commodity has hitherto been imported on a large scale, but domestic refineries are being established in this district, as in other parts of Japan, and in time should supply the Japanese market. This will be of interest when the Philippines and Hawaii are considered.

Beer.—This beverage is made near Osaka and Nagoya. The domestic brew supplies the local market, there being, on account of the protective duty, scarcely any importation of foreign beer, though some ale, porter, etc., is imported. In addition beer valued at $228,462 was exported from Kobé and Osaka in 1904.

Soaps and perfumes.—These are manufactured in this district, and toilet soap valued at $141,926 was exported from Osaka in 1904. There is still a demand for the finer foreign soaps, but the market for them is naturally limited.

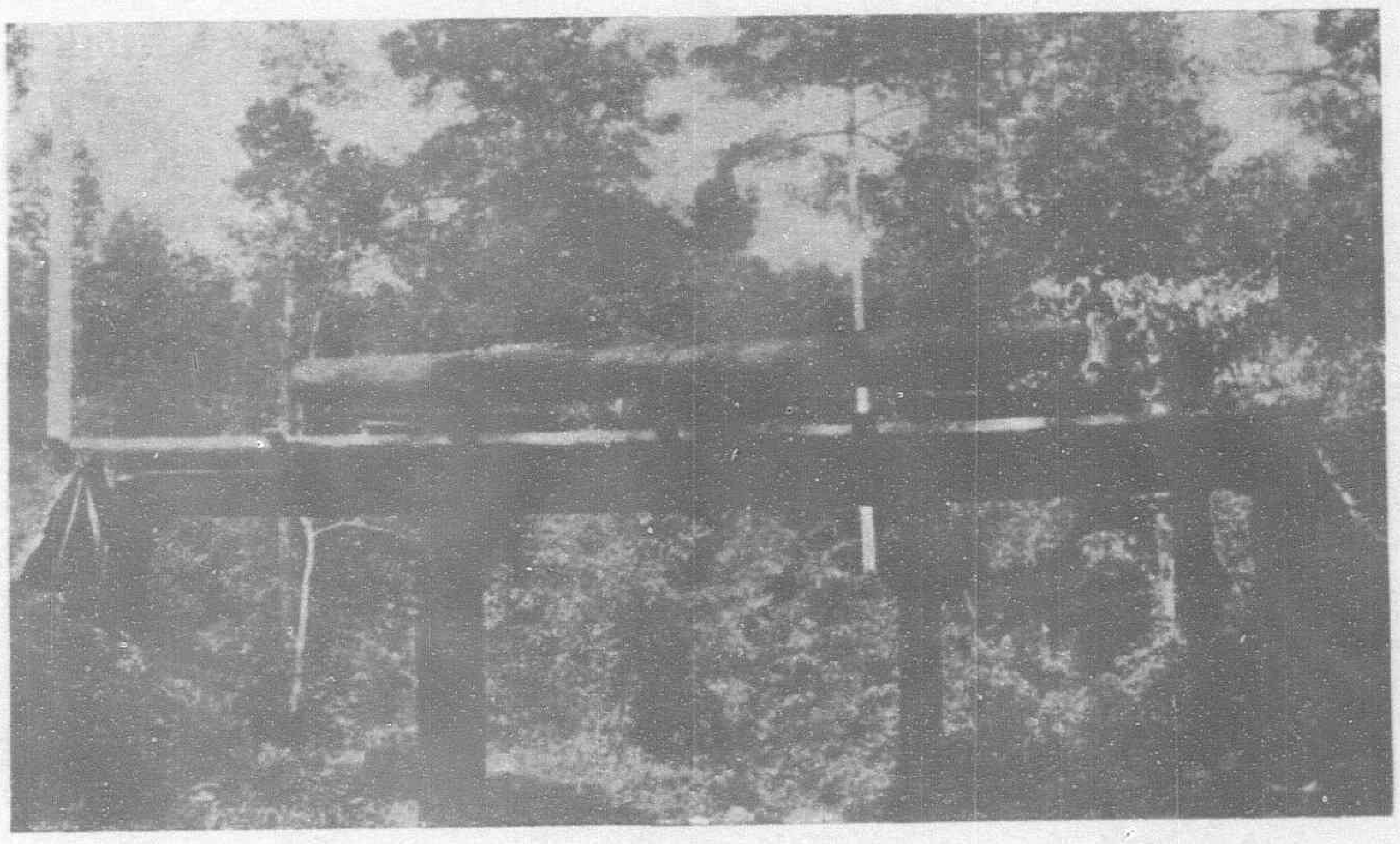
Other manufactures.—Surgical instruments, foreign musical instruments, builders' hardware, tools, stoves, crucibles, drugs, scales, hats, and caps are among the other articles formerly imported in large quantities that are now being made here, and, on account of their cheapness, though sometimes inferior in quality, they are supplanting the imported articles.

That Japan is likely to be active in checking the import of foreign goods which might compete with home industries is shown by the action taken by the chambers of commerce in Japan. It appears that the united chambers of commerce decided some time ago to intrust seven chambers in the country with the preparation of the draft of a new law for the protection and furtherance of Japanese industries, which is to be submitted to the diet. These chambers are said to have appointed special committees to report on the matter.

In the report of the Kobé committee it was recommended that the importation of goods which compete with home industries should be checked as much as possible. This is to be achieved by the raising of the statutory tariff and the abolition of the conventional tariffs or, if the latter measure be inadmissible, by the establishment of consumption taxes.

Cochin State Forest Tramway Built for the Madras Government

Lord Ampthill, Governor of Madras, recently formally opened this line. The scheme, according to *Indian Engineering*, is due to the foresight of the late Dewan of Cochin, who adopted the views of Mr. Alwar Chetty, the Conservator of Forests, in the matter, and gave practical effect to it by entrusting the work to Mr. R. E. Haffield, B. A., B. E., T. C. D., in 1900. This officer was connected with the line from start to finish, and much of the success already derived from it is due to his exertions.



TYPE OF BRIDGE CONSTRUCTION

The Tramway is in three sections connected by two inclined tramways. The first section, from Parambikolam to Pothupara watershed, is 20½ ms. long; the second, from Pothupara to Thoppathikamalai, has a length of 4½ ms., and the third, from Anapanden or foot of Thoppathikamalai to Chalakudi, 19 ms. in length. The first section is connected with the second ;and the second with the third, by the inclined tramways, about 1 m. and 1½ ms. respectively in length. The total length of the line is thus a little over 46 ms. in length, and forms a connection with the Madras Railway.

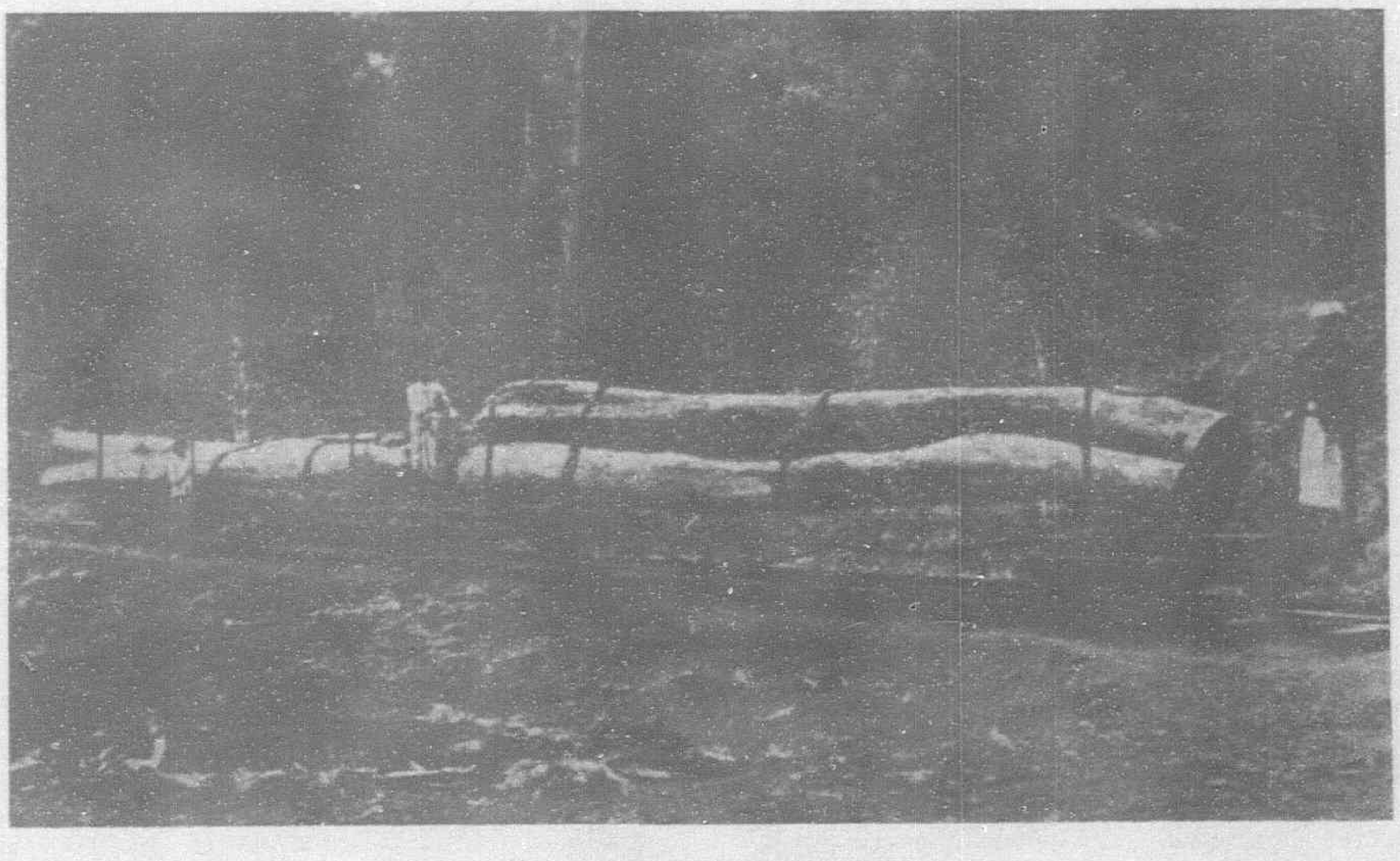
The interior of the Cochin forests has an extent of about 300 sq. ms., of which nearly 250 sq. ms., are virgin forests full of fine, tall, well-grown teak and other valuable trees. Of this area, 127 sq. ms. have been constituted into a working-circle and are being worked on rotation. The tramway is the medium for transporting the timber collected from this area. It is estimated that the department will be able to collect and transport by the line to the place of sale at least 5,000,000 cub. ft. of teak, blackwood and hard junglewoods a yr. This can be done at a cost not exceeding Rs. 2,50,000, and the quality of timber so transported can be sold for at least Rs. 5,50.000. Thus the minimum revenue of three *lakhs* of rupees per yr. is anticipated.

STRETCH OF THE LINE, SHOWING SHARP CURVE

In the construction of the tramway the Calcutta branch of Messrs. Orenstein & Koppel, of Berlin, supplied in all about 50 ms. 20-lb. and partly 25-lb. flat-footed rails which are laid on the timber sleepers available on the spot, the gauge being 3′ 3⅜″ (meter gauge). The cars are *bogie* trucks of 6 tons carrying capacity each, or 12 tons per double-car *bogie*, and, on account of the heavy inclines, are fitted with strong screw brakes acting on all four wheels. Each *bogie* has a swivel bolster with hinged droparms, chains, and hooks, which ensure quick and safe loading and unloading of the heaviest logs.

The locomotives have 6-wheels-coupled and are specially built for wood fuel. These engines can haul 30 tons on a gradient of 1 in 50 and can pass curves of 150′ radius. All of them are fitted with hand as well as steam brakes and are built for a working pressure of 205 lbs. per sq. in.

The tramway has five self-acting inclines with working loads of about 12 tons each, actuated along gradients of 1 in 4 and 1 in 5, their lengths varying from 1,300′ to 3,000′ each. These inclines have also been supplied by Messrs. Orenstein & Koppel.



"BOGIE" WAGONS LOADED WITH LOGS

PHILIPPINE BUILDING STONE

The Philippine resources in stone for building and other construction work, and road metal, are almost unlimited. Among the hard, crystalline rocks, capable of standing heavy pressure, of resisting, weathering, and of taking high polish, should be mentioned the fine gray diorites of the Cordillera, found in almost every province upon the western slopes of the range, and in Paragua, the gray tonalites of quartz diorites of Tinagon and Colasi, Panay, equal to many of the best granites, and a rock, apparently a true syenite, or hornblende granite, recently found in Masbate. Angite-andesite is now being extensively quarried by the Atlantic, Gulf and Pacific Company, at Mariveles, for the works of the improvement of the port of Manila, and a volcanic tuff, soft when quarried but hardening rapidly upon exposure, is quarried in large amount and at good profit at Meycauayan, Bulacan, and Guadalupe, Rizal, and elsewhere, for building stone. This rock has been used in enormous quantity in the construction of churches and other buildings in the Philippines, and in the walls and fortresses of Manila. Crushed andesite has been extensively used in street work in Manila and has made excellent road metal. A large variety of the neo-volcarnic rocks have been used, in addition to gravel, for similar purposes, by the provincial supervisors, in the construction of roads.

FAR EASTERN ENGINEERING, CONSTRUCTION, COMMERCIAL AND FINANCIAL NEWS

PERSONAL

Viscount Aoki has been appointed Japanese ambassador to Washington, and Mr. K. Inouye, minister at Berlin, has been promoted ambassador.

Mr. H. E. Hyde, C. E., of the office staff of the City Engineer of Manila, has been promoted to 1st-Assistant City Engineer. The appointment dates from January 1st.

Mr. Ernest G. Brabrook, Manager of the Far Eastern Department of The Link-Belt Machinery Company, of Chicago, U. S. A., has opened permanent offices at No. 23 Yamashitacho, Yokohama, where he will be pleased to continue receiving enquiries for any information regarding the machinery manufactured by his company. Mr. Brabrook has been travelling through the Orient for more than 3 yrs., during which time he has formed a wide business acquaintance. He is now handling an extensive line of high-grade machinery for which there is a constantly-growing demand thoroughout the Far East.

RAILWAYS, SUPPLIES, ETC.

Railway Concessions, China.—The Peking authorities have notified the foreign ministers that all agreements concerning railways will be cancelled as they expire.

Railways, Philippine Islands.—The Islands of Samar and Leyte have been excluded by all bidders for concessionary grants to construct railways in the Philippines.

Ching-Han (Lu-Han) Railway, China.—A branch of this line, it is reported, is about to be built to Anyang in Honan, where there are rich coalfields, in order to facilitate transportation.

Canton-Hankow Line.—Great excitement has been prevailing among the gentry and merchants of Canton, in consequence of the viceroy's proposal to levy new taxes for the construction of the Canton-Hankow Railway.

Cabanatuan Extension, Manila & Dagupan Railway, P. I.—Governor-General Ide, of the Philippine Islands, recently drove the silver spikes that mark the completion of this line in front of the Cabanatuan station. The event was attended by much ceremony.

Anhui (China) Railways.—Lord Li, director of Anhui Railways, recently made a request for a piece of land in the Settlement of Wuhu, but the British consul absolutely refused to consider it. Lord Li has appealed to Peking to communicate with the British minister, asking him to instruct the consul to consent to the proposal.

Swatow-Chinchow Line.—This railway probably will be opened to traffic during the approaching Spring, as only a small portion of the line remains unfinished. When this line is completed, it is quite likely that the contractors will direct their attention to the proposed Canton-Whampoa Railway, which is to connect with the Swatow-Chinchow.

Japanese Railway Experts for China.—In response to the application of Viceroy Chang Chih-tung, made through the Chinese minister at Tokyo, for the engagement of two Japanese railway experts, the Japanese authorities have recommended Dr. Haraguchi as chief expert and Mr. Omura, an expert in the Japanese Government railway bureau, as assistant. The experts are soon to enter upon their new duties.

Steam Tramway, Panique, Province of Tarlac, Luzon, P. I.—The Philippine Commission has granted a franchise to the Manila Construction Company to build a steam tramway, sidetracks, etc., from the station of the Manila and Dagupan Railway in the jurisdiction of the Town of Panique, Tarlac, W. to and through that place and the Barrios of Salomague, Cabayacasan, Aduas, Batang, Mabilang, Marini, Matubog and Nibalio, to the Town of Camiling, in the same province. The line will be 2½′ gauge.

Home-Made Rails for China.—The Peking Government has ordered all railway administrations to satisfy their requirements for rails and other iron works exclusively in China. The Board of Commerce has issued a similar order to all governors, special attention being drawn to the large iron works of Hanyangfu, Hupeh Province, which, it is claimed by the Chinese authorities, can satisfy all demands. The Board of Commerce is of the opinion that the profit out of the contracts for rails and other iron supplies should not be enjoyed any more by foreigners but by the Chinese themselves.

Tientsin-Chinkiang Railway.—The officials of Shantung, Chihli, and Kiangsu, who have been agitating for the cancellation of the Anglo-German railway, have been definitely informed that it is impossible to do this. One minister of state has advised them, however, to defeat the foreign scheme in another way—by getting enough money together quickly and constructing a railway from Tientsin to Techow before the Germans can complete theirs, and in this way render the foreign concession valueless. This proposition appears to have appealed strongly to the interested Chinese who are laboring industriously to carry it out.

Seoul-Wiju Railway, Korea.—The Japanese Government has already spent -Y-20,000,000 in the construction of the Seoul-Wiju Railway, and will not have to spend another -Y-20,000,000 in relaying the line. The work will take more than 3 yrs., and the expenditure is to be defrayed from the military funds for the time being. The Masan Railway is also to be relaid so as to make it a substantial and permanent work, instead of a hastily-made temporary affair. The cost will amount to about -Y-1,000,000, and the work is expected to be completed in 1908. A railway department will be established in the residency-general of Korea, to deal with all matters relating to the Japanese Railways in Korea.

ELECTRIC LIGHTING, TRACTION POWER, ETC.

Borneo Cable.—The Commercial Cable Company's new cable between Makassar, Celebes, and Balikpapan, Borneo, has been opened for business.

Communication with St. Petersburg Reestablished.—The Imperial Chinese Telegraph Administration announces that communication with St. Petersburg is again reestablished.

New Electric Tramway, Japan.—The Tokaido Electric Tramway Company, organized with a capital of -Y-6,500,000, proposed to construct a line between Shinagawa and Kodzu, on the Tokaido, *via* Yokohama.

Pacific Cable Service Extension.—It is announced by Mr. George Gray Ward, vice-president of the Commercial Pacific Cable Company, that the cable connection between San Francisco and Shanghai and Yokohama will be completed and in good working order by April 1st, next.

Telephone Concession Netherlands India.—A concession has been granted by the Netherlands India Government for a telephone connection between the Island of Great Sambu, Rhio Archipelago, and Singapore. The Royal Dutch Petroleum Company is interested in the venture.

"Waldorf" Hotel, London.—London is to have a superb "Waldorf" hotel, with all the modern refinements in electric light, motors, elevators, etc. Messrs. J. G. White & Co. (Ltd), of London, branch of Messrs. J. G. White & Co. (Inc.) of New York City and Manila, are the contractors. An initial expenditure of $1,500,000 will be made.

Another American Cable to the Orient.—A bill has been introduced in the American Congress, on behalf of the North American Telegraph and Cable Company, which is incorporated under the laws of the State of Washington, U. S. A., for the privilege of laying a cable between Seattle and Manila, and between the same city in America and China *via* the Aleutian Islands, Siberia, Manchuria, and Japan.

Electric Railway Extension, Japan.—The second extended line of the Yokohama electric tramways from Bashamichi to Nishino-hashi, through Samiyoshicho, the front of the customs and Satsumacho, has been opened to traffic. The electric railway between Kanagawa (Yokohama) and Shinagawa (Tokyo) has also been opened. The cars of the latter leave each terminus every 5 mins., and the through fare is 18 *sen* single journey and 34 *sen* return.

Arc Lamps, Manila.—The Municipal Board has decided to adopt a new arc lamp, which is erected by the Manila Electric Railroad and Light Company, on the experimental circuit in Ermita and Malate. After 50 of what is known as "enclosed" arc lamps were installed, the company called the attention of the Municipal Board to the superiority of these lights Five hundred of the new lamps will be installed in the city as soon as practicable.

The Trolley in Japan.—The *Kobe Chronicle* thinks there is about to be a boom in electric railways in Japan. The government railway passenger traffic between Kobé and Osaka has been so affected by the Hanjin Electric Railway that the imperial railway working bureau is considering the advisability of establishing an electric line between the two cities, and so meeting the competition. The bureau is also considering the establishment of such a railway between Tokyo and Yokohama. The extent of this competition may be judged when it is considered that the business man living in Kobé, who has to make frequent visits to Osaka, by using the electric railway not only saves enormously in the amount of fare, but travels nearly as quickly. He uses the electric route because of its freedom from soot and dust.

Japanese Cotton Mills.—There is at the present time a strong tendency on the part of the Japanese to turn to England to obtain the equipment for the enlargement and modernizing of their cotton weaving industry. The situation, however, is being closely watched by American importing houses having branches in New York City, and there is a strong belief that steam turbo-generators, which are looked upon with high favor by the Japanese, with electric motors adapted to running looms and spindles in number of 8 or 10, will meet with success. The engineer of the American Trading Company is making a close study of the situation, and says that manufacturers of steam turbo-generators, motors or dynamos can obtain full information in regard to this matter by corresponding with the New York office of that company. This particular matter is being watched closely by representatives of English and German concerns.

Valuable Franchise Granted in Manila, P. I.—The Philippine Commission has granted to the Manila Electric Railroad and Light Company permission to construct an electric tramway line from Manila to the Pueblo of Pasig, beginning at the corner of Calle Cabildo and the Ayuntamiento (palace) in the Walled City, passing in front of the Catholic Cathedral to Calle Claveria, thence W. with double track along the latter street to a point E. of Malecon Drive, thence N along the glacis parallel with Malecon Drive to the Pasig River at the Anda Monument, thence W. along the Pasig River to the E. end of the present quartermaster warehouses, thence around the warehouses with a single-track loop, and the necessary sidings and turnouts. The company has the right to carry freight and parcels over ethe line thus enabling it to transport freight direct from the terminal of the Manila and Dagupan Railway, in the Trozo District, through the city to the wharves and docks which are to be constructed along the Malecon. Under the terms of the franchise the grantee must pay to the treasurer of the Philippine Islands, for the benefit of the City of Manila and the Province of Rizal, 2½ per cent of the gross earnings from the business done under this franchise, and the act of the commission which grants the franchise contains the proviso that the franchise may be withdrawn by the Municipal Board, with the consent of the Philippine Commission, by giving 12 mos.' notice to the grantee. Messrs J. G. White & Co. (Inc.) will construct the extension.

Orders from Japan with American Concerns.—Takata & Co., 10 Wall Street, New York, have secured a contract from the Nippon Seido Riusan Hirio Kaisha for considerable electrical apparatus, orders for which have been placed by their New York office as follows: One Westinghouse 225-kw., 440-volt, 3-phase, 60-cycle, rotating field, alternating current, engine type generator, operating at a speed of 225 r.p.m., direct-connected to a Westinghouse 18 and 30 by 16 compound engine. A 12½-kw, type "S," 125-volt. compound-wound generator has been ordered for an exciter. This exciter will be driven by means of a belt from a pulley on the engine. The order also includes a Type 6-B, 3-phase generator panel and a Type 6-B, 3-phase feeder panel, together with all the necessary instruments, etc., mounted upon it; also one 20-h. p., 400-volt, 3-phase, 7,200 alts., induction motor; one 30-h. p. ditto, one 50-h. p. ditto, and one 75-h. p. ditto. The order also includes a lot of portable instruments, etc. Takata & Co. have also ordered for the same contract, from the Knowles Steam Pump Works, one surface condenser containing 600 sq. ft. of cooling surface, mounted over a combined air and circulating pump, size 10 x 12 x 12 x 12, and one horizontal duplex power pump, double acting piston pattern, size 5½ x 6; speed 50 r.p.m., direct driven by a Westinghouse 7½-h. p. motor; also from the Burt Manufacturing Company, for use on the engine, one standard exhaust head. The contract also calls for one 10x10 air compressor having a capacity of 135 cu. ft. of air at 150 r.p.m. This compressor was ordered from the Bury Compressor Company, Erie, Pa., and is direct driven by a Westinghouse 30-h. p. motor.

More Japanese Electric Orders.—Takata & Co., New York engineering department, reports the following recent orders from Japan for Westinghouse machinery, etc.: *Takata & Co., Tokio*—Ten 1-kw, type "N" transformers, 7,200 alternations; twenty 2-kw type "N" transformers, 7,200 alternations; twenty 3-kw type "N" transformers, 7,200 alternations; twenty 4-kw type "N" transformers, 7,200 alternations; twenty-five 5-kw type "N" transformers, 7,200 alternations; ten 7½-kw type "N" transformers, 7.200 alternations. *Osaka Arsenal*—One portable wattmeter, single-phase, 7200 alternations; one portable voltmeter, direct current and alternating current; one portable ammeter, alternating current. *Nagoya Industrial School*.... Two 10- h. p. shunt-wound, type "S" motors, 110 volts; two type "K," direct-current; 120-amp. ammeters. *Osaka Arsenal*—Two type 8-A, 250-volt, 3-phase, feeder panels, an extension to a previous Westinghouse installation. *Ashio Mine*—Three 150-h. p. 2,000-volt, 6,000-alternations, 3-phase, type "C," alternating-current induction motors; two 25-h. p., 500-volt, 6,000 alternations, 3-phase, type "C" induction motors; one 15-h. p., 500-volt, 6,000-alternations, 3-phase, type "C" induction motors; one 15-h. p., 500-volt, 6,000-alternations, 3-phase, type "C" induction motor, arranged for gear connection to a countershaft, complete with Laminar fibre motor pinions, gear wheel, etc.; six 75-kw, 2,000-520-volt, 6,000-alternation transformers; three 50-kw, 2,000-520-volt, 6,000-alternation transformers. *Takata & Co., Tokio*—Ten direct-current, enclosed arc lamps, series potential, 200-220 volts, 16 series resistances. *Hokkaido Tanko Railway Company*—One 75-kw, single-phase, alternating-current, revolving armature generator, 7,200 alternations, 2,200 volts, 720 r.p.m., driven by a Westinghouse standard engine, 13½ by 12,; one 2-kw, 125-volt exciter for the above generator; one marble switchboard consisting of one exciter panel, one generator panel, one feeder panel, for the control of the generator and the exciter mentioned above, together with three feeders; ten 5-kw, type "B" transformers; five 3-kw, type "B" transformers.

WATERWORKS AND IRRIGATION

Experimental Irrigation, Madras.—The Government of Madras is talking of a very large area of land in the Bellery District for the establishment of an experimental pumping irrigation farm on the Hagani River.

Canton (China) Waterworks.—Although the preliminaries connected with the proposed construction of the Canton waterworks are being proceeded with as rapidly as possible, according to *The China Mail*, the viceroy is anxious to have the work completed sooner than was at first anticipated. He has instructed the Prefect of Kwongchowfu to arrange with the foreign contractors to complete the work within 3 mos., as the viceroy is afraid that owing to the undrinkableness of the present water supply public health will be greatly endangered on the approach of the plague season.

Proposed Water Supply, Bangkok.—An 8″ artesian well at Dusit Park, Bangkok, is flowing freely and is capable under air compression of supplying 1,000,000 galls. of water daily, and this fact has led to the consideration of a proposition to utilize artesian water for city consumption. By putting down 10 of these wells in a restricted area, as is frequently done in America, putting air compressors on them and forcing the water into a central well and from that to a standpipe at least 100′ high, 10,000,000 galls. of water daily, it is estimated enough for the use of the entire city can be furnished. Besides the healthful effect of pure water upon the inhabitants, the proposed system would solve the question of fire protection, etc.

BUILDINGS

Harbor Office, Hongkong.—It is understood that the new harbor office at Hongkong will be ready for occupancy in March.

New Hotel for Tokyo.—The Imperial Hotel Company, Tokyo, proposes to build a new hotel of 100 rooms, of which the present hotel will be a branch

Barracks for Constabulary, Philippine Islands.—Plans are being prepared at Constabulary headquarters in Manila for the construction of a number of barracks for the enlisted men in the insular rural guard.

Bonded Warehouses, Yokohama.—A scheme for the establishment of bonded warehouses at Yokohama has been filed for government approval by Messrs. Hiranuma Enjiro and Suga Jinzo. The warehouses are designed to cover a space of 2,141 *tsubo*.

Episcopal Cathedral, Manila.—The corner-stone of the Episcopal Cathedral of St. Mary and St. John was laid January 25th. The work of construction was commenced in November by the Atlantic, Gulf and Pacific Company. It will be a reinforced concrete structure.

New Hotel, Manila.—At the suggestion of the Philippine Commission the Municipal Board of Manila has postponed the date for advertising for bids for the construction of a hotel building on the proposed Luneta Extension site. It had been the intention to begin advertising next month.

New Military Buildings, Camp Stotsenberg, P. I.—The B. W. Cadwallader Company has secured the contract for the construction of new military buildings at Camp Stotsenberg, the amount submitted being ₱271,950. O. F. Campbell, of Manila, bid ₱280,988, and S. C Choy, Manila, ₱282,000. Contractor Delmar W. Smith bid with the B. W. Cadwallader Company. Part of the buildings are to be completed in 30 days, and the remainder in 60 days, from the date of the contract.

PUBLIC WORKS

French Settlement, Tientsin.—During the present yr. about $100,000 will be spent in public improvements in this settlement.

Additional Sewerage, Manila.—The Department of Sewer and Waterworks Construction, Manila, is advertising for contracts for an additional sewer system to be laid through the new-made section of land along the bay front on the W. side of Malecon Drive, and through the reclaimed area designated as the Luneta Extension. The sewerage through the new district will connect the new sewer system proper in the Walled City.

Improving Canton, China.—Under the supervision of a local engineer, Canton, according to *The China Mail*, in the vicinity of the site of the old Temple of Longevity, is undergoing transformation. Two hundred and fifty houses for Chinese are to be built on sanitary lines, and after the style of those common in Hongkong, and they will stand on roads 30′ wide, with scavenging lanes in the rear. Thirty feet roadways will be quite a novelty in Canton. A new theater and a police station are also to be built.

Calamba-Bay-Los Baños Road, Luzon, P. I—The Philippine Commission has appropriated out of the present bond issue for public improvements in the Philippines, the sum of ₱35,600 for the completion of the Calamba-Bay-Los Baños Road, Laguna Province, Island of Luzon. This road has been in process of construction since March, 1904, when ₱34,000 were set aside to start the work. The road will be 11 ms. long and will form an important link for transportation around the S. coast of Laguna de Bay.

Public Works, Saghalien.—The public works which are now being carried out on the Island of Saghalien, in Southern Karafuto, under the direct supervision of the Civil Administration of Japan, are the felling of timber in Shiretoko Promontory and the construction of a road over 50 ms. long between Darineh and Mautchi. The lumber factory originally established at Arakuri by the Russian Government, is being used, and about 40 people are at work there. More than 3,500 coolies are engaged in the construction of the road, which is expected to be completed before midsummer. At Korsakoff the erection of a civil administration office and a club-house, the latter on the site of the former Japanese consulate, is progressing.

PORT WORKS, DREDGING, DOCKS, ETC.

Fourth Dock Opened, Japan.—The new Fourth Dock, at Yokosuka, 550 x 87 x 31½ ft., was recently opened.

Por-Arthur Dock Reinstated.—The Japanese have thoroughly reinstated the dock at Port Arthur, and it will now take in vessels up to 6,000 tons.

Management of Shanghai Dockyard.—The Peking Government has sanctioned the change of management of the naval dockyard at Shanghai, which, in future, will be conducted as a commercial enterprise.

Consolidation of Pacific Ocean Lines.—There is an unconfirmed report, which seems to carry with it considerable foundation, that the fleet of the Pacific Mail Steamship Company has been absorbed by the Toyo Kisen Kaisha (Oriental Steamship Company) of Japan.

Sandakan Slipway.—*Peerless*, a 3-masted schooner from Cebu, P. I., was recently drawn up on the slipway of the China Borneo Company at Sandakan. The vessel is 127′ long with a beam of 33′ and depth of hold 9′ 9″. It is estimated that when drawn up her dead weight was between 450 and 500 tons. The China Borneo Company has also overhauled the S.S. *Borneo*, from Zamboanga, Province of Mindanao, P. I.

Yokohama Harbor Works.—The Government of Japan has decided to appropriate -Y-8,500,000 towards the improvement of Yokohama Harbor—for dredging, breakwater works, landing facilities, etc. The scheme of work is to be finished in 6 yrs., and of the cost the Municipality of Yokohama will bear ⅓. To meet this expense it is proposed to issue municipal bonds, and arrangements have already been made to float a loan among foreign capitalists.

Wharf at Tanjong Batu, B. N. B.—The wharf at Tanjong Batu is in hand and 5,000-ton cargo boats will be able to lie alongside. A careful survey to the approach is required. The Tobacco Estates at the head of Maruda Bay will use this port when it is completed. A railway now in course of completion will lead to a pier on the spit at the N. end of Tanjong Batu Bay which will continue out to sea until a depth of 26 ft. at l. w. s. tides has been reached.

Nippon Yusen Kaisha's European Service.—This company has placed the American liner *Iyo-maru* on its European line, which had been maintained exclusively with chartered foreign ships since the beginning of the war. She has sailed from Yokohama for European ports. *Shinano-maru*, which was recently released from the government service, has taken the place of *Iyo-maru* on the American berth. The steamers *Nikko-maru* and *Yawata-maru* have been placed in the Australian service.

Whangpoo Conservancy, Shanghai.—The viceroy has established an office of the Whangpoo Conservancy at Shanghai, and has appointed Mr. Ku Hung Ming as resident director to manage the general affairs of the Conservancy Board. The viceroy also appointed Mr. John Goodnow as adviser on foreign affairs to the board, and an expert, Taotai Ho, as assistant general director. It is claimed by certain newspapers on the China Coast that the viceroy has exceeded his authority in making these appointments, and they are calling upon the foreign ministers at Peking to call upon the Peking Government to rescind his action.

Improvements at Wonsan, Korea.—The British pro-consul at Wonsan, Korea, reports particulars of an extensive reclamation scheme which is to be undertaken by the Japanese municipality at that port. The ground so reclaimed will be sold for commercial purposes. The depth of water alongside of portions of the new sea frontages will be upwards of 20′, and probably wharves and piers will be constructed. It is expected that the railway depôt will be established near these wharves The course of the river will probably be altered. The work is estimated to cost something under -Y-1,000,000, and will render the port one of the best in Korea. In giving his consent, as commissioner of customs, to the undertaking, Mr. Wakefield, the British pro-consul, stipulates that subjects of all nationalities shall have the right to purchase and hold ground in the area to be reclaimed on equal terms. This has been accepted by the Japanese consul.

SHIPBUILDING, MARINE, ETC.

Java-China-Japan Line.—A new steamer for the service of this company in East Asia has been ordered from the Company de Schelde, at Flushing.

Steamer *Ohio IV* Sold.—The Deshler steamer *Ohio IV* has been sold to the Nippon Yusen Kaisha and renamed *Hiroma-maru*. The Deshler service between Shanghai and Chefoo has been suspended.

Another Japanese Destroyer.—A destroyer to be named *Oikaze* is to be launched at the Maizuru Navy Yard, Japan, shortly. The vessel is 375 tons displacement with a speed of 29 knots, and will be armed with 6 quick-firing guns.

Repairs to Ships, Kiangnan Dock, Shanghai.—The steamers *Poyong* and *Kiangfoo* are being repaired at the Kiangnan Dock, Shanghai. The whole bow of *Poyong* is smashed, her stem being broken in two places. The repairs to *Kiangfoo's* engines will occupy 2 mos.

Ice-Breaker for Vladivostock.—An ice-breaker, ordered by Messrs. Kunst & Albers, Hamburg and Vladivostock, has undergone a successful trial trip, and will be transported to the Siberian port by the Hamburg-America Line. The ice-breaker is named *Paul*, and has engines of 180 h. p.

New Vessels, Toyo Kisen Kaisha.—Two steamers for this line, to ply between Oriental ports and San Francisco, are being built at Nagasaki, work on them having commenced in November last. The vessels are to be 12,500 tons burden, and it is expected that the first will be finished by the end of 1907.

Another Cruiser for Japan.—The Navy Department of Japan has placed another order with the Mitsu Bishi Dockyard for a cruiser of *Chihaya* type, this being the sixth order secured by the company. Its dimensions are as follows:—Displacement, 1,350 tons; length, 300′; breadth, 31′; depth, 80′; speed, 20 knots.

Steamer *Macquarrie* Sold.—This steamship, which has been lying idle in Hongkong Harbor for some time, has been sold for $80,000. She will be employed transporting Russian troops from Vladivostock to Odessa. *Macquarrie* was formerly one of the Ducal Line, and was purchased, after stranding, by Messrs. McArthur & Co., of Sydney, N S. W.

New Chinese Steamship Line.—The Paoshêng Steam Navigation Company has been started in Shanghai with offices in the native suburb of Nant'ou, where is also located the wharf of the company for mooring its steamers. The company owns for the present four small steamers. The shareholders of the new concern are mostly Cantonese.

Utility of Motor Boats in Manchuria,—Though the current of the Liao River at Niuchwang ranges from 3.4 to 7.8 naut. ms., per hr., in swiftness, according to the season and state of the tide, motor boats will, it is believed, prove useful on it, and a number will possibly be purchased during the current yr. Port Arthur, Dalny, Harbin, and other points are also suited to motor-boat service.

New Japanese Steamer in Commission.—*Dasihin-maru*, a steamer of 1,306 tons, which has been built at the Mitsu Bishi Dockyard, Nagasaki, to the order of the Osaka Shosen Kaisha, has been placed in commission. She is a sister-ship of *Daichi-maru*, recently built by the Osaka Iron Works for the Tientsin Line. During the winter season, when the Pei Ho is frozen, the new steamer will be put on the Tairen or Korean Line, with *Daichi-maru*.

Voyage of the Drydock *Dewey*.—The mammoth steel floating drydock *Dewey*, which has been constructed for the use of the American Navy in the Philippines, was, at last accounts, crossing the Atlantic Ocean in tow of the tug *Potomac*, and accompanied by three colliers, *Caesar*, *Brutus*, and *Glacier*. Simultaneous with the commencement of this extraordinary voyage the Hydrographic Office at Washington issued a warning to ship captains to keep a sharp lookout for the vessels towing the huge bulk. When strung out on a towline, the dock and the line measure 1 m. A wireless message recently received at Norfork, Va., from *Glacier* showed that the dock was progressing at the rate of about 4½ ms. per hr.

MINES AND MINING

Foreign Concessions, China.—The Peking authorities have notified the foreign ministers at Peking that all agreements concerning mining concessions will be cancelled as they expire.

German-Chinese Mining Company.—This company intends to open new mines in the District of Sinn-tschann, Prefecture of Tsinanfu, which are very near to the railway. The scheme has the sanction of the Peking authorities.

Yunnan and Kweichow (China) Mines.—The Board of Commercial Affairs at Peking has asked the Viceroy of Yunnan to report upon all the mines in Yunnan and Kweichow, and also whether they are operated with foreign capital.

Mining in Manchuria. H. E. Chao Erh-hsün, Tartar general of Fêngtien, has asked the Peking authorities to establish a bureau of mining affairs to investigate the mines in Manchuria and to forestall any foreigners in claiming them.

Hungchung Iron Mines, China.—The iron mines at Hungchung, Shansi Province, on which a Belgium syndicate had designs, has been acquired by a Chinese company, which intends to begin work on the property in the Spring.

Enlarging Milling Plant, Pantai, F. M. S.—The Milling and Mining Company, F. M. S., is adding another 20 head of stamps to its plant at Pantai. Part of the plant of the Rin Lode Mine, at Jelebu, purchased by M. Kester, will go to Pantai, while the remainder is for use on M. Kester's property close by.

Workings Abandoned, Borneo.—The Borneo Company, Ltd., has closed down its old workings at Jambusua These were started towards the end of 1901, and a considerable pumping plant was erected. However, the quantity of gold found has been too small and the expense of obtaining it too great to bring profit.

Fushun Coal Exports.—Recently 1,350 tons of coal from the Fushun mines were imported at Wakamatsu, Japan, for the first time and the fuel is now under trial at the government iron foundry. The Fushun lump coal is reported to be equal to 1st-class Kyushu coal, in quality, but the dust coal is very inferior.

French Concessions, Fukien.—The concessions granted to French citizens to open gold mines at Kienningfu and Chanwufu in Fukien not having been acted on before the expiry of the stipulated period, the Chinese authorities proposed to cancel them, but the French minister at Peking has asked for an extension of from 2 to 3 yrs., the delay being due to unavoidable circumstances.

Mining in the Federated Malay States.—The number of gold-mining companies under European management has of recent yrs. dwindled sadly in Pahang. As regards tin there are only six companies left. The only working gold-mining company left is the one at Raub, under the management of Mr. W. H. Martin Time was when there were over a score of companies falling over each other in Pahang, but conditions have changed wonderfully since the days of the "Pahang Boom." The Perak French Mining Company's workings in the Triang are said to be doing well, the ore being exported partly *via* the Kuala and partly through Jelebu. The only other tin working in that locality belongs to a Seremban capitalist.

Minerals, British North Borneo.—The following mineral production is noted:—*Manganese*—At least 20,000 tons of ore are ready for shipment and numerous gangs of coolies are at work blasting and stocking ore constantly; the mountains are full of the ore, both in huge boulders and in beds. *Coal*—Indications have been found, but the seam is not yet located. *Chromite*—Is being worked. *Iron*—A mountain of very high grade iron ore has been found containing on calculation 15,000,000 tons. *Copper*—Copper ore has been discovered near Tanjong Batu. *Smokeless Coal in Jambongan*—Large floating boulders heve been found in Jambongan Island, one of which weighed 1 cwt. Boring operations are going on to locate the main lode.

India's Gold Mining Returns.—The following are the returns for December, 1905—*Balaghat*—4,400 tons of quartz crushed yielded 3,502 ozs., 2,750 tons of tailings cyanided yielded 313 ozs. and from plates 302 ozs., making a total yield of 4,117 ozs. of gold. *Champion Reef.*—Milled 19,720 tons which produced 15,522 ozs., 16,566 tons of tailings treated by the cyanide process produced 2,183 ozs., making a total production of 17,705 ozs. of gold. *Mysore.*—16,650 tons of quartz crushed produed 15,403 ozs., Steamings from plates 1,005 ozs., Basebar (Mills) 239 ozs. and 14,741 tons of tailings cyanided yielded 1,819 ozs., making a total of 18,468 ozs. of gold. *Mysore West.*—Mills ran 679 hrs., crushed 1,879 tons, yielded 1,018 ozs. bar gold. 2,304 tons of tailings treated by the cyanide process yielded 122 ozs. of standard gold. *Nundydroog.*—7,000 tons of quartz crushed yielded 5,186 ozs., 7,290 tons of tailings, cyanided, yielded 650 ozs. and obtained from plates 282 ozs., making a total of 6,118 ozs. of gold *Ooregum.*—Stuff crushed 10,176 tons, gold produced 4,661 ozs. and slimes and tailings cyanided 10,098 tons, produced 918 ozs., making a total of 5,529 ozs. of gold. *Hutti (Nizam's).*—851 ozs. of gold from 2,000 tons of quartz crushed and 273 ozs. from 2,000 tons of tailings cyanided, making a total of 1,124 ozs. of gold.

Mining Industry, Burma.—The latest official intelligence regarding the ruby mining industries in Burma comes through a government blue book just published on the administration of the province in 1904-05. The production of the gem during 1904 was practically confined to the ruby mines district. Stones valued at Rs. 13,92,514 were won by the Ruby Mines Company in 1904 as against Rs. 14,68,636 in 1903, though 4,00,000 more truck loads of earth were treated than in the previous year. The royalties paid by native miners fell from Rs. 3,51,910 in 1903-04 to Rs. 2,20,372 in 1904-05, the decrease being attributed to the exhaustion of the more accessible ground. The construction of an important drainage tunnel was undertaken to prevent the flooding of the mines. The total output of gold in 1904 was 215.76 ozs. The Kyaukpazat mine which produced nearly 1,400 ozs. of gold in 1903 was closed during that year, the reef being worked out, and the output of 1904 was obtained almost entirely by dredging. Several concessions for gold-dredging operations were granted by the authorities in 1904 during the course of which a number of applications for exploring or prospecting licenses and for mining leases were dealt with by the government. An expert examination of the gold-bearing rivers of Upper Burma is to be made with a view to the framing of suitable regulations Among other mineral industries in Burma that of jade mining continues to expand satisfactorily. From the Myitkyina mines, the output of jade rose from 1,169 cwts. of the value of Rs. 77,691 in 1903 to 2,244 cwts. of the value of Rs. 1,50,087 in 1904, the value of the exports of the stone to China, which absorbs the whole of the output exceeding in 1904 by Rs. 80,000, the figures of 1903. Dynamite is now freely used in the working of the mines, There is some interesting information regarding the progress of the Burma petroleum industry in the same official report. The total production of oil in 1904 was 115,903,800 galls. or 30,575,313 galls. in excess of 1903. No effective competitor has appeared against the Burma Oil Company, which again largely increased its output. The principal oil-bearing fields are the Yenangyaung field, which has now been extended N. to Singu in the Myingyan District and the Yenangyat field. Efforts were made during the yr. by prospectors to follow up the course of the in rich oil bearing seams of the Yenangyaung and Yenangyat fields, but concessions granted the Lower Chindwin, Shwebo and Upper Chindwin districts and in Thayetmyo and in Prome proved unprofitable. The Arakan oil fields in the Kyaukpyu and Akyab districts also continue to produce oil, but the output was small. Negotiations were in progress during 1904 regarding arrangements for the construction by the Burma Oil Company of a pipe-line to connect the Yenangyaung and Yenangyat oil fields with the refineries at Rangoon for the purpose of reducing the cost of carriage.

MISCELLANEOUS NOTES

Wool for Japan.—Japanese factories are at the present buying most of their wool in the Australian market.

Public Works Department.—The Surveyor's and Engineer's Department of the Municipal Council, Shanghai, is in future to be known as the Public Works Department.

Sugar Refinery Works, Tsingtau, China.—Messrs. von During Wiebel & Co. will shortly erect large sugar refinery works at Tsingtau, to cost about 1,000,000 marks.

Domestic Exhibition Postponed, Japan.—The Japanese Government has postponed indefinitely the sixth domestic exhibition, which should have been opened in 1907.

Oil Operators Amalgamate, Japan.—The leading owners of the oil wells in Formosa, Hokkaido. and Aomori have decided to amalgamate their interests with a capital of -Y-1,500,000.

Cardiff Coal Receipts, Hongkong.—During 1905 Cardiff coal to the quantity of 306,280 tons arrived in Hongkong, most of which found its way into Japanese possession during the recent war.

"Open Ports," China.—The Chinese Government has formally notified the foreigng ministers at Peking of the opening to foreign trade of the cities of Chinanfu, Weihsein and Chuosun, in Shantung.

Salt Refinery, Liaotung, Manchuria. —Japanese have formed a syndicate for the establishment of a large salt refinery at this place. The syndicate has already raised $1,000,000 for this purpose. The sale of the salt and the whole establishment will have an official character.

Rizal Monument, Manila.—The Philippine Commission has passed an act which provides for the free entry through the customs of the figure, stone, and other materials necessary for the monument to Dr. José Rizal, the Filipino patriot and martyr, which is to be erected in Manila.

Brick Factories, Hupeh, China.—The provincial administration of Hupeh is establishing brick factories which will be able to supply the demand for the building of public schools in the province. Factories are being built at Tjinkou and in the Spring the manufacturing of brick will be commenced in earnest.

Automobiles in China.—According to an American consular report the American automobile seems to be firmly established in China, and the growth in the sale of these vehicles is very noticeable. The New York Export and Import Company is the only American concern in Shanghai dealing in automobiles.

Lighting Contract, Perak, F. M. S.—Messrs. Huttenbach Bros. & Co. have obtained the contract for lighting the new Kitson lamps at Perak for a period of 2 yrs., 10 mos. Messrs. Tate & Co. will light the present lamps till March 1st, by which time the total number of 84 lamps required will be erected.

Trade Calendars, 1906.— The Far Eastern Review is in receipt of some elaborately-designed and very beautiful trade calendars for 1906. The following firms have contributed:—Alhambra Cigar Factory, The Club Stables, and E. C. McCullough & Co., Manila, and the Morris Machine Works, Baldwinsville, N. Y.

Kerosene Oil Trade, Manchuria.—American kerosene oil has secured a monopoly of this trade in Manchuria, almost completely eliminating the Russian product from this part of China. Sumatra oil continues to compete very strongly with the American product in other parts of China, particularly in South China.

Belgium's Trade with China.—Published statistics give the following as Belgium's trade with China for the past year:—Railway cars, $399,510; machinery (not denominated), $208,866; steel, unfinished, sheets and bars, $434,636; steel, finished, $418,231; brass and nickel, $11,580; cast iron, finished, $12,545; old iron, $3,524; wrought iron, $1,056,096; finished iron, $ 415,722; galvanized iron $2,509; zinc, $56,742. Total (gold) $3,-019.871.

Wakamatsu Iron Foundry, Japan.—According to the *Jiji* during the late war, the Wakamatsu Government Iron Foundry greatly extended its business. It was able to furnish the military authorities with rails for laying light railway lines; and it built locomotive engines of small size for the same. The blast-furnace was also got to work smelting, and every class of material rquired for the manufactures of arms could be obtained from the Foundry. Thus it is now possible, the journal adds, that the Wakamatsu Eoundry, in co-operation with the Government arsenals, may realize the long-cherished hope of manufacturing all classes of weapons without depending on any foreign aid whatever.

American Goods in Manchuria.—An American consular report says that while a large percentage of the coasting steamers fly the British flag, the English-made goods, particularly cottons, do not sell in the Manchurian markets as readily as those imported from America. As a rule, however, the fact that American and English goods are to be relied upon goes far to cause ready sales in that part of the world. The Chinese purchaser feels that American-made goods are safe to buy, and for that reason it has been temporarily profitable in the past to foist upon the Chinese cheap imitations of honest American wares. The protection now afforded by trademarks, jointly by the United States and Great Britain, will practically eliminate this infringement.

Growth of Manufacture, Japan.—According to a report of the minister of finance of Japan, exports of manufactures have increased from $27,000,888 gold in 1900, to $48,306,000 in 1904. Of late the government has made great efforts to assist manufactures. It has held expositions at home, taken part in foreign expositions, established an office to study industrial conditions, assisted the organization of industrial associations , and sent abroad many subjects to study foreign industries. To facilitate the participation of capital in industrial undertakings, the mortgage law was passed last March, according to which the land, machinery, etc., belonging to an industrial establishment constituted a security fund for mortgage purposes.

Aermotors and Windmills, Siam.—The Government of Siam is completing preliminary surveys for an elaborate system of irrigation which is intended to convert much of what is at present waste land or forest into productive fields for the cultivation of rice, the great staple of the country, and also for fruits and vegetables. In order to irrigate their fields from the present system of *klongs* or small canals, which penetrate the area now under cultivation, the Siamese use the most primitive methods, consisting of scoops suspended by a rope from a stick or a kind of treadmill containing small compartments, each of which brings up about 1 pt. of water. Both of these methods are performed by coolie labor. With the introduction of more extensive and scientific systems of irrigation will undoubtedly come a demand for improved methods of raising water for the fields, and this demand should be supplied by aermotors, windmills, and pumping apparatus. One or two American aermotors are now in use there and are giving satisfaction. Recent orders of Danish machinery of this kind have also been given.

Canada's Export Trade with the Orient.—In its export trade the Dominion of Canada is seeking openings in the Orient. It is assumed that whenever the Grand Trunk Pacific completes its line to the coast this result will follow, though the Canadian Pacific already has a line of steamers between Vancouver and Oriental ports A flour trade in competition with the United States is predicted. Mills at Alberta, at Calgary, are now building with the hope of shipping flour to Japan instead of sending all the grain E. in the form of wheat. Four more flour mills are also projected for Vancouver. Whether Canadian goods other than foodstuffs ever will find a large market in Japan and China is problematical The dominion hardly will be able to compete with machinery shipped from the United Kingdom. It is probable that Canada will come within the provisions of the general trade treaty between Great Britain and Japan, application for these concessions having been made. Under this treaty the Japanese tariff against Canada will be reduced on hides, leather, leather goods, condensed milk, sugar, livestock, cotton and woolen goods, paper, enamelware, rubber goods, and hats and caps.

FINANCIAL NEWS

Banking Branches in Kobe.—The projected Kobé branch of the Deutsch-Asiatische Bank has been established. The Russo-Chinese Bank has reopened its Kobé branch.

Banks of Japan.—According to investigations completed by the Tokyo Government, the number of banks throughout Japan are 2,255. Their combined capital is -Y-530,880,819.

Korean Auxiliary Coinage.—The Osaka mint has struck -Y-30,000 worth of 1-*sen* and ½-*sen* copper coins of the Korean auxiliary coinage, which have been sent to Korea for circulation.

Chinese Eastern Railway.—The French minister at Peking is reported to have proposed to the Chinese foreign office that France should furnish China with the money to repurchase the Chinese Eastern Railway from Japan.

Standard China Company.—This company has been organized with a capital of £100,000 in £1 shares to acquire lands, mines, mineral grants, mining rights, concessions, etc., with particular reference to Yunnan, or elsewhere in China.

British North Borneo Company.—It is announced in London that this company has made arrangements for the issue of shares up to 500,000 of its unissued capital. The money received for these shares will be devoted to the general purposes of the company, to the paying off of debentures, and towards the extension of the projected railway across the state to Cowie Harbor.

Money for Mines and Railways, China.—Owing to the lack of funds for promoting mining and railway interests in the provinces of China, the Peking Government is going to raise a railway and mining loan among the Chinese merchants and others, at $500 per debenture bearing 5 per cent interest *per annum*. The loan may be redeemed at any time after the lapse of 30 yrs. from date of issue.

China Provident Loan and Mortgage Company, Ltd., Hongkong.—At the 9th annual meeting of this corporation it was reported that the gross earnings during 1905 amounted to $131,721.22 as against $132,860 for 1904, so the company is able to pay a dividend of 8 per cent and place $20,000 to reserve, which brings that fund up to the round number of $100,000, leaving $4,791.73 to the credit of the current yr.'s account.

Peking Syndicate, China.—The Peking authorities have telegraphed to the Chinese minister at London stating that they have made arrangements with the British minister in Peking regarding the purchase of the Peking Syndicate's Taokou-Chinghua Railway. about 270 *li* in length, in Honan Province, by the payment of £700,000, which will be regarded as a Honan railway loan at 5 per cent interest *per annum*.

Hongkong Land Reclamation Company, Ltd.—The net profits of this company in 1905 were $555,781.09 after paying all charges, which sum includes $4,557.32 brought forward from the previous yr. A dividend of 8 per cent will be paid on the paid-up capital and a bonus of 4 per cent thereon. After providing for this and writing off directors' and auditors' fees there remains a balance of $383,058.73 to be carried to the credit of a new profit and loss account.

Japan's Domestic Debt—The Tokyo authorities announce the redemption of a part of the 6 per cent domestic debt. doubtless with the proceeds of the last foreign loan. The program is that -Y-40,000,000 worth of bonds sold originally at 90, drawn by the lot during the fore part of the current mo., shall be redeemed between March 21st and 31st. Another -Y-40,000,000, redeemable between April 16th and 25th. has also been drawn. The remainder of this particular 6-per cent loan will be reduced between May 16th and 25th.

Hongkong Ice Company, Ltd.—Messrs. Jardine, Matheson & Co., general managers, have submitted a statement of the company's accounts for the yr. 1905. Including $5,356.77 brought forward from the previous yr., and after deducting $20,000 paid as interim dividend of $4 per share, the balance at credit of profit and loss account is $128,776.31 which it is recommended should be appropriated as follows:—A final dividend of $15 per share, $75,000; provision for contingencies, $20,000; to write off property account, $30,000; to carry forward $3,716.31.

FAR EASTERN SHARE QUOTATIONS

COURTESY OF BENJAMIN, KELLY & POTTS, SHAREBROKERS, HONGKONG, February, 1906.

STOCK	WHEN ESTABLISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND	WHEN PAID	Approximate Return at Present Quotation* PER CENT	CLOSING QUOTATIONS
Banks.												
Hongkong and Shanghai Banking Corporation	1865	$10,000,000	80,000	$125	$125	*g* £1,000,000 *s* $8,500,000 *i* $250,000	... $1,702,728	30-6-05	£1.15/- at exchange 1/10½= $18.66.67 for first half-year 1905	21-8-05	5	$895 London £96
National Bank of China, Limited	1891	£699,475	99,925	£7	£5	$200,000	........$41,768	31-12-04	$2 (London 3/6) for 1903	1-2-04	—	$38 buyers
Marine Insurances.												
Canton Insurance Office, Limited	1881	$2,500,000	10,000	$250	$50	$1,600,000 *j* $147,895	...... $211,540	31-12-04	$20 for 1904	21-10-05	6¼	$325 buyers
China Trader's Insurance Co., Ld.	1865	$2,000,000	24,000	$83.33	$25	$950,000 *f* $169,215 *j* $202,455 *u* $296,955	.... Nil.	30-4-05	$4½ for year ended 30-4-1905	18-12-05	5	$91 sellers
North China Insurance Co., Ld.	1863	£150,000	10,000	£15	£5	*g* £100,000 *s* Tls. 100,000 *f* Tls. 50,000	...Tls. 302,053	30-6-05	Final of 7/6 making 15/- for 1904	25-10-05	5½	Tls. 95
Union Insurance Society of Canton, Limited	1867	$2,500,000	10,000	$250	$100	*s* $2,000,000 *g* £40,000 *f* $331,453 *j* $1,043,930 *u* $1,152,346	.....$2,339,112	30-6-05	$40 for 1904	20-10-05	5½	$735
Yangtsze Insurance Association, Ld.	1862	$800,000	8,000	$100	$60	$750,000 *i* $50,000 *j* $5,890	...... $599,364	31-12-05	$12 and $3 special dividend for 1903	12-4-05	8½	$172½
Fire Insurances.												
China Fire Insurance Co., Ld.	1870	$2,000,000	20,000	$100	$20	$1,000,000 *x* $218,039 *f* $2,241	...... $260,374	31-12-04	$6 dividend and $1 bonus for 1903...	10-3-05	8	$88 sales
Hongkong Fire Insurance Co., Ld.	1868	$2,000,000	8,000	$250	$50	$1,200,505	...... $360,372	31-12-04	$34 for 1903 ...	7-3-05	10¾	$325 sellers
Shipping.												
China and Manila Steamship Co., Ld.	1882	$750,000	(*1*) 30,000	$25	$25	$5,000	$8,832	31-12-04	$1 for 1904	27-3-05	5	$20 buyers
Douglas Steamship Co., Ld.	1883	$1,000,000	20,000	$50	$50	$261,638 *i* $88,941	.... Nil.	30-6-05	$3½ for year ended 30-6-1905	25-9-05	8¾	$40 buyers
Hongkong, Canton and Macao Steamboat Company, Ld.	1865	$1,200,000	80,000	$15	$15	*e* $250,000 *d i* $600,000 *f* $145,376	.... $8,064	30-6-05	$1 for first half-year 1905	16-8-05	8	$26 sellers
Indo-China Steam Navigation Company, Ld.	1882	£1,200,000	(*2*) 60,000	£10	£10	£120,000 *i* £241,150 *h* £3,999	.... £4,435	31-12-04	12/- @ 1/10 ⅞=$6.29.51 for 1904 ...	13-7-05	6½	$97 sales
Shanghai Tug and Lighter Co., Ld. .. Do. Preference..	1903	Tls. 1,500,000	200,000 100,000	Tls. 50	Tls. 50	*i* Tls. 25,000	... Tls. 43,762	31-12-04	Interim of Tls. 2. for 1905...... Interim of Tls. 1¾ for 1905......	28-8-05	7½ 7½	Tls. 58½ buyers Tls. 50 sellers
"Shell" Transport & Trading Co., Ld.	1898	£2,000,000	2,000,000	£1	£1	£400,000 *i* £4,144	........£7,815	31-12-04	1/- (Coupon No. 6) for 1905	1-1-06	4½	23/-sellers
"Star" Ferry Co., Ld	1898 1900	$200,000	10,000 10,000	$10 $10	$10 $5	$65,000 *i* $24,257	.... $929	30-4-05	$1.80 for year ended 30-4-1905 90 cents for year ended 30-4-1905	29-5-05	5¾ 4	$32 sellers $23 sellers
Straits Steamship Co., Ld.	1890	$500,000	(*3*) 5,000	$100	$100	$400,000 *e* $21,075 *i* $130,153	.... . $21,231	31-12-04	$10 for 1904	21-3-05	7	$149 buyers
Taku Tug & Lighter Co., Ld.	—	T.T 1,500,000	30,000	T. Tls. 50	T. Tls. 50	Tls. 98,000 *d* Tls. 195,479 *e* Tls. 28,000 *i* Tls. 81,200	... Tls. 4,333	31-12-04	Interim of Tls. 2 for 1905	27-7-05	9¼	Tls. 36 buyers
Refineries												
China Sugar Refining Company, Ld.	1878	$2,000,000	20,000	$100	$100	*e* $450,000 *r* $150,000	.... $42,812	31-12-04	Interim of $10 for 1905	18-8-05	10	$210
Luzon Sugar Refining Company, Ld.	1882	$700,000	7,000	$100	$100	none	*Dr.* $85,987	31-12-04	$3 for 1897	24-3-98	—	$25 buyers
Perak Sugar Cultivation Co., Ld.	—	Tls. 350,000	7,000	Tls. 50	Tls. 50	Tls. 100,000	... Tls. 3,723	31-7-05	Tls. 2½ for year ending 30-9-1904 ...	17-12-04	—	Tls. 72½ sales
Mining.												
Chinese Engineering & Mining Co., Ld.	1901	£1,000,000	1,000,000	£1	£1	*d* £80,000 *h* £12,289	...... £13,355	28-2-05	Final of 1/- (No. 5)	2-11-05	—	Tls. 9.80 buyers
Oriental Consolidated Mining Co., Ld.	1901	G. $5,000,000	*y* 500,000	G. $10	G. $10	none	G. $672,093	31-12-04	50 cts. final mak. G. $1 for '05 (No. 5)	21-12-05	—	G. $17 sellers
Raub Australian Gold Mining Co., Ld.	1892	£200,000	150,000 50,000	£1 £1	18/10 £1	£4,873	*Dr.* £8,745	31-3-05	No. 12 of 1/-=48 cents	28-1-01	—	$4¼

STOCK	WHEN ESTAB-LISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND	WHEN PAID	Approximate Return at Present Quotation* PER CENT	CLOSING QUOTATIONS
Docks, Wharves and Godowns.												
Farnham (S. C.), Boyd & Co., Ld	1901	T5,520,000	55,200	T100	T100	T1,000,000	.........T34,924	30-4-05	Interim of Tls. 4 for year 1905-6.	6-1-06	9½	T128 sellers
Fenwick (Geo.), & Company, Ld.....	1889 1905	$450,000	6,000 z 12,000	$25	$25	$70,000	.... $8,577	31-12-04	$3¾ for 1904,........................ First year................................	13 3-05 —	— —	$25 $24½ buyers
Hongkong and Kowloon Wharf and Godown Co., Ld......................	1886	$2,000,000	40,000	$50	$50	$250 000 d.r. $58,423 i $10,000 p $300,000	.........$29,422	31-12-04	Interim of $2½ for 1905...............	26-7-05	4¾	$108
Hongkong & Whampoa Dock Co., Ld.	1901	$2,500,000	50,000	$50	$50	i $41,500	........$501,332	30 6-05	$6 for first half year '05	22-8-05	8	$165 sales
New Amoy Dock Co., Ld....................	1892	$67,500	10,000	$6¾	$6¾	$55,500	*Dr*....$10,260	31-12-04	$1¼ for 1903................................	5-5-04	7	$17
Shanghai and Hongkew Wharf Co. Lt.	1902	T3,200,000	32,000	T100	T100	b T487,210 r T59,880	........T10,711	31-12-04	Interim of T6 for 1905..................	23-8-05	5½	T2230 sales
Yangtsze Wharf and Godown Co., Ld..	1902	T250,000	2,500	T100	T100	T17,500	..........T2,762	31-12-04	T18 for 1904..................................	29-3-05	8½	T212½ buyers
Lands, Hotels and Buildings.												
Astor House Hotel Co., Ld.................	1901	$750,000	(4) 30,000	$25	$25	$14,156	..........$9,028	30-6-05	$2½ for year ending 30-6-1905	19-8-05	9¼	$27 sales
Astor House Hotel, Ld. (Tientsin)	—	T. T100,000	2,000	T. T50	T. T50	T34,000 e T8,000	.... T806	29-2-05	Interim of T5.....	21-10-05	8	T130 buyers
Central Stores, Ld..........................	—	$91,845	6,000	$15	$12	$20,000	.........$1,502	31-12-04	Final of 60 cents making $1.80 for '04..	30-3-05	12	$15
Do. (Founders')............			123	$15	$12				None.........	—	—	$100
Do. (New Issue)..............	1904	$360,000	24,000	$15	$7½				Preferential of 7% for '04..........	30-3-05	7	$7½
Hongkong Hotel Co., Ld.	1866	$600,000	12,000	$50	$50	$648,975 r $31,087	........$10,126	30-6-05	$5 for first half-year 1905...............	4-9-05	6¾	$150
Hongkong Land Investment and Agency Co., Ld.	1889	$5,000,000	50,000	$100	$100	e $250,000	.........$37,875	31-12-04	Interim of $3½ for 1905................	27-7-05	5½	$120 ex div.
Hotel des Colonies Co., Ld. (Shanghai)	1902	T225,000	9,000	T25	T25	n T20,986	.... T7,202	31-3-05	Interim of T1..................................	1-11-05	14	T17
Hotel Metropole Company, Limited	1904	$200,000	2,000	$100	$100	none	..........$4,699	30-6-05	Final of $6 making $10 for the year	26-7-05	10	$100
Humphreys' Estate & Finance Co., Ld.	1887	$1,500,000	150,000	$10	$10	i $200,994 e $50,000	.........$11,958	31-12-04	90 cents for 1904..........................	11-2-05	7	$12¾ sales
Kowloon Land and Building Co., Ld. ..	1889	$300,000	6,000	$50	$30	none	.... $377	31-12-04	$3 for 1904...................................	31-1-05	7½	$40
Shanghai Land Investment Co., Ld.....	1901	T2,600,000	52,000	T50	T50	T828,813 e T170,000	........T40,066	31-12-04	Interim of T3 for 1905................	21-7-05	6¾	T120 buyers
Tientsin Hotel des Colonies, Ld.	1903	T70,000	1,400	T50	T50	none	.... T670	31-12-04	Interim of T3 for 1905...........	4-7-05	12	T45 sellers
Tientsin Land Investment Co., Ld......	1902	T772,600	7,726	T100	T100	i T67,300	.... T725	31-12-04	Interim of T3 for 1905................	2-8-05	6	T115 sellers
West Point Building Co., Ld.	1889	$625,000	12,500	$50	$50	none	..........$1,247	31-12-04	Final of $490 making $3.65 for 1905	2-2-06	7	$53 ex div.
Cotton Mills.												
Ewo Cotton Spinning and Weaving Co., Ld.	1895	T1,000,000	(5) 20,000	T50	T50	T45,939	.......T100,000	31-10-05	T8 for year ended 31-10-1904.........	18-12-05	17	T48 sellers
Hongkong Cotton Spinning, Weaving and Dyeing Co., Ld..................	1901	$1,250,000	125,000	$10	$10	e $30,000	.........$23,264	31-7-05	$1 for year ended 31-7-1905...........	4-9-05	7	$14
International Cotton Manufacturing Co., Ld.	1895	T750,000	(6) 10,000	T75	T75	T100,000	........T18,718	30-9-05	Interim of 3% a/c 1898................	30-4-98	—	T44 buyers
Laou-kung-mow Cotton Spinning & Weaving Co., Ld.	1895	T800,000	(7) 8,000	T100	T100	none	........T10,000	31-12-04	Interim of 4% a/c 1898 on 6,000 shares	1-8-98	—	T60 sellers
Soey Chee Cotton Spinning Co., Ld.....	1895	T1,000,000	2,000	T500	T500	T5,658	........T22,051	31-12-04	4 % for 1897................................	2-2-88	—	T250 buyers
Miscellaneous.												
Anglo German Brewing Co., Ltd.	1904	$100,000	4,000	$100	$100	none	...............$20	31-12-04	None......................................	—	—	$100
Bell's Asbestos Eastern Agency, Ld.....	1895	£5,377.10s	8,604	12/6	12/6	£314	.... £770	31-12-04	1s. 3d per share for 1904................	21-7-05	10	$6½ sellers
Campbell, Moore & Co., Ld...............	1886	$12,000	1,200	$10	$10	$8,000	..........$1,182	31-12-04	$3 for 1904	1-4-05	8¼	$36
China-Borneo Co., Ld........................	1903	$720,000	(8) 60,000	$12	$12	none	—	31-12-04	$1 for 1904	17-3-05	10	$10 sellers
China Flour Mill Co., Ld.	—	T200,000	4,000	T50	T50	T30,000	............T718	31-12-04	Interim of T5 for 1905	24-7-05	—	T80 sellers
China Light and Power Co., Ld.	1901	$500,000	50,000	$10	$10	none	..........$3,739	29-2-04	804 for 1905.................................	22-1-06	9	$9 sales
China Provident Loan and Mortgage Co., Ld.	1898	a $1,000,000	100,000	$10	$10	$80,000	..........$1,581	31-12-04	80 cents for 1904...............	18-1-05	9	$9 sales
Dairy Farm Company, Ld..................	1896	$187,500	25,000	$7½	$6	$25,000	..........$2,864	31-7-05	$1.20 for year ending 31-7-1905	24-11-05	7¾	$15½

STOCK	WHEN ESTAB-LISHED	CAPITAL	NO. OF SHARES	VALUE	PAID UP	RESERVE	AT WORKING ACCOUNT	DATE	LAST DIVIDEND	WHEN PAID	Approximate Return at Present Quotation* PER CENT	CLOSING QUOTATIONS
Miscellaneous.—Continued												
Green Island Cement Co., Ld.	1889	$1,500,000	150,000	$10	$10	*p* $400,000 $500,000	$95,054	31-12-04	$2 for 1904	27-2-05	7	$29 buyers
Hall & Holtz, Ld.	—	$420,000	21,000	$20	$20	$186,000	$7,551	29-2-05	Final of $1½ making $2½	15-4-05	9½	$6 sales
Hongkong Electric Co., Ld.	1889 1899	$600,000	30,000 30,000	$10 $10	$10 $10	none	$2,151	30-4-05	$1.00 50 cents for year ending 30-4-05	17-7-05	6½ —	$15½ buyers $15 buyers
Hongkong High-Level Tramways Co., Ld.	1887	$125,000	1,250	$100	$100	$50,000	$2,796	30-11-04	$15 for year ending 30-11-04	24-12-04	7	$225
Hongkong Ice Company, Ld.	1881	$125,000	5,000	$25	$25	*k* $60,000	$5,356	31-12-04	Interim of $4 for 1905	2-8-05	6¾	$250
H'kong Rope Manufacturing Co., Ld.	1883	$500,000	10,000	$50	$50	$60,000	$11,137	31-12-04	$10 for 1904	10-4-05	7	$152 buyers
Hongkong Steam Waterboat Co., Ld.	1900	$150,000	15,000	$10	$10	$2,500	$88	30-9-05	Final of 50 cents making $1 for year ended 30-9-1905	24-11-05	7¾	$12
Lane, Crawford & Co., Ld. (Shanghai).	1903	$250,000	2,500	$100	$100	none	$42,009	29-2-05	Interim of $5	20-11-05	9½	$145
Maatschappij tot Mijn-, Bosch-en Landbouwexploitatie in Langkat	1902	Gs.2,500,000	25,000	G.100	G.100	*i* T528,210 T19,465	T35,849	31-10-04	4th quarterly dividend of T7½ making in all T22½ for '05	15-12-05	9½	T235 selllers
Mondon, (E. L.) Ld.	1902	T350,000	7,000	T50	T50	none	*Dr.* T117,638	31-12-04	T5 for 1902	2-5-03	—	T25 sellers
Philippine Company, Ld.	1904	$675 000	67,500	$10	$10	none	*Dr.* P53,619	31-12-04	None	—	—	$5 buyers
Shanghai and Hongkong Dyeing and Cleaning Co., Ld.	1903	$60,000	1,200	$50	$50	none	*Dr.* $16,455	31-8-05	None	—	—	$50
Shanghai Gas Co., Ld.	1903	T800,000	16,000	T50	T50	*d* T145,000 T108,172	T8,011	31-12-04	Interim of T3½ for 1905	26-7-05	7	T128 sales
Shanghai Horse Bazaar Co., Ld.	1904	T270,000	5,400	T50	T50	T45,000	T9,751	31-12-04	T6 for 1904	17-3-05	9	T67½ buyers
Shanghai Pulp and Paper Co., Ld.	—	T450,000	4,500	T100	T100	T25,000	T6,968	31-12-04	Interim of T6 for 1905	22-7-05	9	T150 sales
Shanghai Sumatra Tobacco Co., Ld.	1902	T600,000	*(9)* 30,000	T20	T20	*w* T24,820 T25,000	T1,297	31-10-04	Interim of T2	20-10-05	14	T62 sellers
Shanghai Waterworks Co., Ld.	1881	£144,000	7,200	£20	£20	T170,000	T17,220	31-12-04	Interim of 15/- for 1905,	27-7-05	4½	T460
South China Morning Post, Ld.	1903	$150,000	6,000	$25	$25	none	*Dr.* $5,068	29-2-05	None	—	—	$20
Steam Laundry Co., Ld.	1902	$100,000	20,000	$5	$5	none	$1,134	31-5-05	50 cents for year ended 31-5-05	20-11-05	8¼	$6 sales
Straits Ice Company, Ld.	1884	$200,000	2,000	$100	$100	$25,000	$700	31-12-04	$5 account 1905	...-2-05	—	$160 buyers
Tientsin Waterworks Co., Ld.	1901	T. T200,000	2,000	T. T100	T. T100	*e* T15,259 T4,000	T1,012	30-4-05	Final of T4½ making T8½ for '04/5.	17-6-05	7½	T. T105
United Asbestos Oriental Agency, Ld. Do. do (Founders')	1896	$100,000	9,900 100	$10 $10	$4 $10	$22,000	$551	31-5-05	80 cents $19.80 for year ended 31-5-05.	29-7-05	9 11	$9 $180
Watson (A. S.) & Co , Ld.	1886	$900,000	90,000	$10	$10	$300,000 $25,000	$6,096	31-12-04	Final of 50 cents making $1 for '04.	29-5-05	7¾	$13
William Powell, Ld.	1901	$150,000	15,000	$10	$10	*e* $4,500	$676	30-6-05	Interim of 50 cents for 1905	25-11-05	11	$11

LOANS AND DEBENTURES	AGENTS FOR THE LOAN	AMOUNT OF LOAN	PAR VALUE	OUT-STAND'G BONDS	WHEN PAYABLE	CLOSING QUOTATIONS	
China Government, 7 per cent. Silver Loan 1886 E.	Hongkong & Shanghai Bkg. Cor.	T767,200	T250	1969	Mar. 31st & Sept. 30th each year until Mar. 31st, 1917.	par.	Plus accrued interest
Hongkong Hotel Co., Ltd., 6% Mortgage Debentures of 1899‡		$500,000	$500	§ all	Half yearly, June 30th and December 31st	par.	
Shanghai & Hongkew Wharf Company, Ltd. 6% Debentures of 1902		T543,900	T100	....	Half yearly, June 30th and December 31st	T97	
Astor House Hotel Co., Ltd. 8% Debentures of 1903		T500,000	T100	....	Half yearly, January 1st and July 1st	T104	
Chinese Engineering & Mining Co., Ltd., 6% Debentures of 1903†	....	£500,000	¶	£431,960	Half yearly, June 30th and December 31st	par.	
International Cotton Manufacturing Co., Ltd. 6% Debentures of 1901	Russo Chin. Bk.	T500,000	T100	....	Half yearly, March 31st and September 30th	par.	

a Auhorized capital $2,000,000
b Building Reserve Account.
c Capital Reserve Fund.
d Depreciation Fund.
e Equalization of Dividend Fund.
f Exchange and Investment Fluctuation Account.
g Gold Reserve Fund
h Exchange Reserve Account.
i Insurance Fund.
j Reinsurance Fund.
k Contingencies Account.

l Legal Reserve Fund.
m
n Sinking Fund.
o
p Premium on New Issue.
q
r Repairs and Renewals Account.
s Silver Reserve Fnnd.
t
u Underwriting Suspense Accoount.
v

w Special Works Funds.
x Extra Reserve Fund.
y 75,000 owned by the Company
z 6,000 shares unissued.
1 5725 shares unissued.
2 First issue of 60,000 of which 10,411 unallotted.
3 785 shares unissued.
4 7,600 shares unissued.
5 5 000 shares unallotted.
6 1.616 shares unallotted.
7 842 shares unissued.

8 14,000 shares unissued.
9 17,000 shares unissued.
* Based on last year's dividend.
‖ Only Tls. 134,000 taken up.
§ 268 held by the Company.
¶ In certificates of £20 and £100
‡ Redeemable in 10 years, or at option of Company the Company giving 6 months' notice.
† Redeemable at par at rate of £10,000 per annum from 31st Decmber,
Dr. Deficit.

SINGAPORE SHARE QUOTATIONS.

Courtesy Messrs. Fraser & Co., Brokers, Singapore, February, 1906.

NAME	DATE OF FOR-MATION	CAPITAL	CAPITAL PAID UP	NO. OF SHARES	ISSUE VALUE	PAID UP	RESERVE	LAST DIVIDEND	SINCE LAST MAIL		CLOSING QUOTATIONS
									HIGHEST	LOWEST	
Mining.									$	$	$
Bersawah Gold Mining Co., Ltd	1900	$175,000	140,000	10,000 [1]	10	10	......	......	......	......	15.00 sellers
" " " " " *Deferred.*				4,000	10	10	......	......	......	......	8.00 sellers
Bruseh Hydraulic Tin Mining Co., Ltd	1901	$600,000	600,000	60,000	10	10	......	......	......	......	9.15 sales
Kadana Gold Mining Co., Ltd	1901	$300,000	300,000	20,000	10	10	......	......	......	......	2.00 sellers
" " " " " *Pref.*				10,000	10	10	......	......	......	......	10.00 nominal
Kechau Goldfields, Ld. *Fully paid*	1902	£30,000	16,175.7/-	6,207	1	1	......	......	......	......	in liquidation
" " " *Contrib.*				10,493 [2]	1	19/-	......	......	......	......	in liquidation
Kuantan Tin Mining Co., Ltd	1905	$150,000	99,000	9,900 [3]	10	10	......	......	......	......	12.00 buyers
Pahang Corporation, Ltd	1889	£250,000	244,306	244,306 [4]	1	1	20,000	3 per cent for year ending 30-6-02	......	......	2.00 sellers
Pahang Kabang, Ltd	1890	£375,000	375,000	360,000	1	1	......	......	......	......	0.25 sellers
" " " *Pref.*				15,000	1	1	......	......	......	......	...... nom.
Queensland Raub G. M. Co., Ltd. *Fully paid*	1901	£146,700	100,866	36,700	1	1	......	......	......	......	...... nom.
" " " " *Contrib.*				110,000	1	11/8	......	......	......	......	...... nom.
Raub Aust. Gold Ming. Co., Ltd. *Fully paid*	1892	£200,000	191,250	50,000		1	4,873	1s. paid January, '01	......	......	3.25 buyers
" " " " *Contrib.*				150,000	1	18/10	......	1s. " " "	......	......	3.25 buyers
Redjang Lebong Mining Co.	1898	*f.*2,000,000	1,800,000	18,000 [5]	100	100	......	22 9-10% for year ending 31-12-04	......	......	440.00 ......
Royal Johore Tin Mining Co., Ltd	1900	$220,000	220,000	22,000	10	10	......	5 " for year ending 15-2-04	3.50	3.00	3.50 sales
Sipiau Tin Co., Ltd	1899	$230,000	230,000	23,000	10	10	......	5 " for ½ year ending 30-6-05	6.50	6.00	6.50 ......
The Belat Tin Mining Co., Ltd	1903	$300,000	300,000	30,000	10	10	......	......	......	......	4.50 sellers
The Pusing Lama Tin Mines, Ltd	1904	£120,000	98.000	98,000 [6]	1	1	......	......	11.65	11.15	11.15 sellers
Tronoh Mines, Ltd	1902	£160,000	149,185	149,185 [7]	1	1	......	7s. paid during 1905	20.25	20	20.00 sales & sellers
Duff Development Co., Ltd	1903	£400,000	350,000	350,000 [8]	1	1	......	......	......	......	8.00 sellers
Rubber.											
Anglo-Malay Rubber Co., Ltd	1905	£150,000	140,000	140,000 [9]	1	1	......	......	......	......	......
Balgownie Rubber Estate Ltd	1905	$200,000	100,000	20,000	10	5	......	......	10.00	8.75	$10......
Batu Caves Rubber Co. Ltd. *Fully paid*	1904	£30,000	11,125	7,000 [10]	1	1	......	......	......	......	....
" " " " *Contrib.*				11,000	1	7/6	......	......	......	......	....
Bukit Rajah Rubber Co. Ltd *Fully paid*	1903	£70,000	59,250	55,000 [11]	1	1	......	......	......	......	£3 10s. 0d. ......
" " " " " *Contrib.*				7,000	1	15/-	......	......	......	......	£3 5s. 0d.
Cicely Rubber Estates Co	1904	£12,000	10,500	6,000	1	1	......	......	......	......	£2 5s. 0d.
" " " 5% Pref.				6,000	1	15/-	......	......	......	......	£2 5s. 0d. ......
Consolidated Malay Rubber Estates, Ltd	1905	£75,000	55,000	55,000 [12]	1	1	......	......	......	......	£1 17s. 6d. ......
Sione Rubber Company, Ltd	1905	$100,000	88,000	8,800 [13]	10	10	......	......	16.00	15.00	$15.75 sales
Sungei Way (Selangor) Rubber Co., Ltd	1904	£50,000	15,670	6,920 [14]	1	1	......	......	......	......	£2 0s. 0d. buyers
" " " " *Contrib.*				35,000	1	5/-	......	......	......	......	£1 4s. 0d. ......
The Batu Unjor Rubber Co., Ltd	1905	$700,000	610,000	61,000 [15]	10	10	......	......	......	......	$25.00 sales
The Pataling Rubber Estate Syndicate	1903	£30,000	20,000	20,000 [16]	1	1	......	......	......	......	£5 5s. 0d. ......
The Ribu Planting Co., Ltd	1904	$200,000	135,000	1,350 [17]	100	100	......	......	......	......	$270.00 ......
The Sandycroft Rubber Co.	1904	$100,000	85,000	850 [18]	100	100	......	......	227.50	225.00	$227.50 sales
The Selangor Rubber Co., Ltd	1898	£30,000	26,300	26,300 [19]	1	1	......	......	......	......	£7 15s. 0d. ......
The Singapore & Johore Rubber Co., Ltd	1903	$100,000	91,500	150	100	100	......	......	......	......	$160.00 sales.
" " " " " " *Contrib*				850	100	90	......	......	......	......	$150.00 sales.
Vallambrosa Rubber Co	1904	£60,000	50,000	50,000 [20]	1	1	......	......	......	......	£5 0s. 0d. ......
General.											
Fraser & Neave, Ltd	1898	$225,000	225,000	4,500	50	50	112,500	10 p. ct. and 2½ per cent bonus for '04	102.00	101.00	102.00
Hogan & Co., Ltd	1904	$480,200	334,800	3,348 [21]	100	100	5,000	7 per cent for. 1904	......	......	40.00 sellers
H'kong and Shanghai Banking Corporation	1865	$10,000,000	10,000,000	80,000	125	125	10,000,000 [25] 9,500,000 [26] 250,000 [27]	35s. and 20/- bonus for ½ year ending 31-12-05	......	......	800.00 buyers
Howarth Erskine, Ltd	1901	$1,200,000	1,200,000	12,000	100	100	275,000	10% and 5% bon. for yr. end. 30-6-05.	......	......	270.00 sellers
Maynard & Co., Ltd	1901	$34,000	34,000	3,400	10	10	......	15 p. ct. for year ending 31-10-05	......	......	23.00 sellers
Riley, Hargreaves & Co., Ltd	1899	$875,000	875,000	6,000	100	100	150,000	10 p. ct. and 2½ p. ct. bon. for year '04	......	......	195.00 ......
" " " " 7% Pref.				2,750	100	100	......	7 p. ct. for year 1904	......	......	115.00 buyers.
Singapore Cold Storage Co., Ltd	1903	$600,000	240,000	24,000 [22]	10	10	......	......	......	......	10.00 sales
Singapore Dispensary Ltd	1891	$30,000	30,000	600	50	50	19,000	12½ per cent for year ending 31-7-04	75.00	70.00	70.00 sellers
Straits Ice Co., Ltd	1884	$200,000	200,000	2,000	100	100	22,000	5 " interim for 1905	......	......	160.00 ......
Straits Steam Ship Co., Ltd	1890	$500,000	421,500	5,000 [23]	100	100	400,000 169,228 [28]	5 p. ct. interim for 1905	......	......	150.00 sales
Straits Trading Co., Ltd	1887	$3,000,000	2,500,000	250,000 [24]	10	10	700,000 1,021,395 [29]	10 p. ct. & 5 p. ct. bon. ½ yr. end. 30-9-05	......	......	42.25 sales
Tanjong Pagar Dock Co., Ltd	1864	$3,700,000	3,700,000	37,000	100	100	1,950,000	$6 for half year ending 31-12-05	......	......	475.00 sellers
Debentures. $											
Howarth Erskine Ltd. 7 per cent ... 250,000	......	......	......	......	......	......	......	......	......	......	3 per ct. prem. buyers
Singapore Municipal 6 " ... 400,000	......	......	......	......	......	......	......	......	......	......	1 " prem.
" " 5 " ... 1,878,000	......	......	......	......	......	......	......	......	......	......	par buyers
" " 4 " ... 602,300	......	......	......	......	......	......	......	......	......	......	2 " dis. nominal
Riley, Hargreaves & Co., Ld. 6 p. cent 225,000	......	......	......	......	......	......	......	......	......	......	1 " prem buyers
Tanjong Pagar Dock Co., Ld. 6 " 250,000	......	......	......	......	......	......	......	......	......	......	1 " prem buyers
" " " " 5 " 1,365,500	......	......	......	......	......	......	......	......	......	......	par buyers

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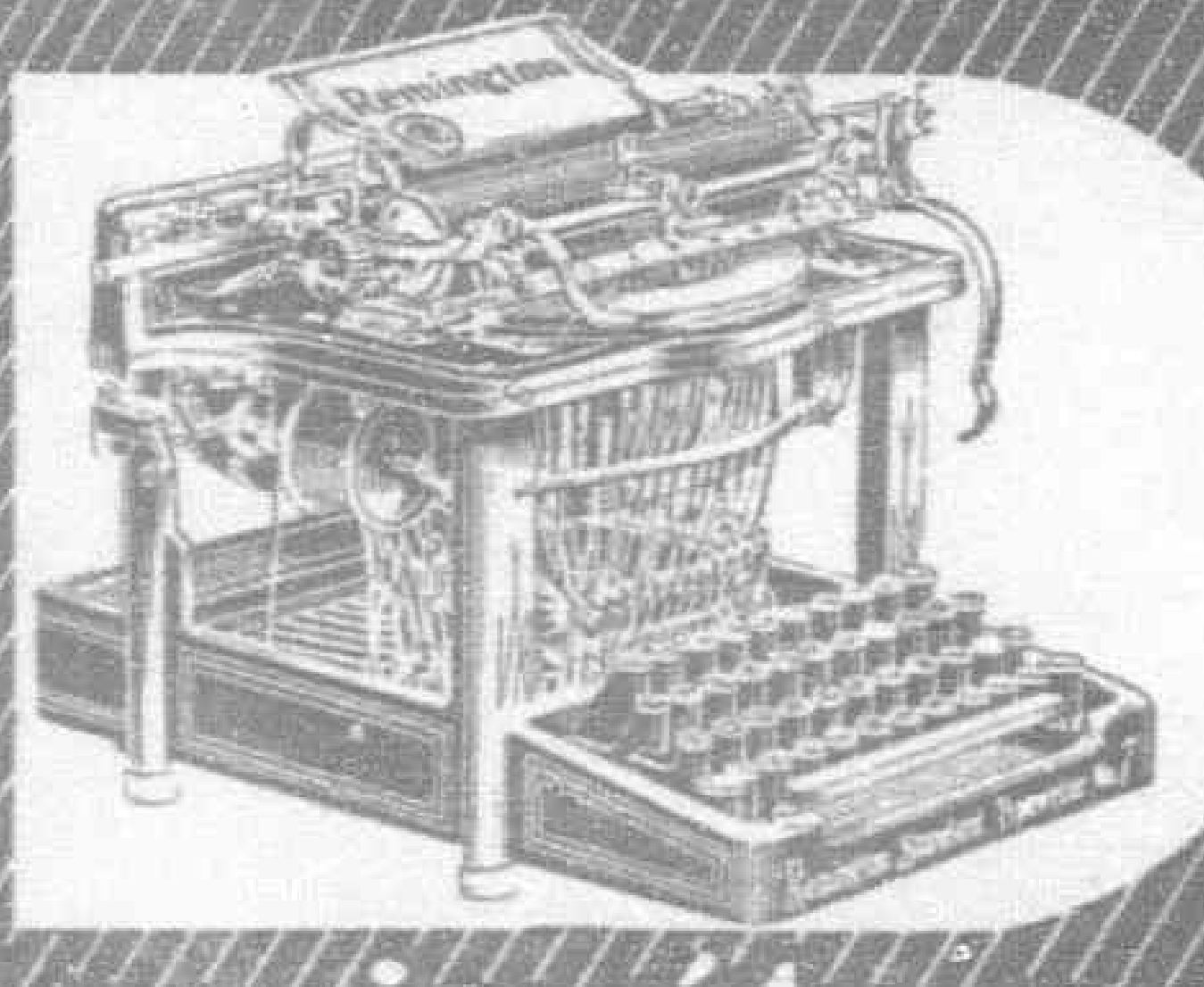
[1] 3,500 unissued.
[2] 13,300 "
[3] 5,100 "
[4] 5,694 "
[6] 22,000 unissued
[7] 10,815 "
[8] 50,000 "
[9] 10,000 "
[11] 9,000 unissued
[12] 20,000 "
[13] 1,200 "
[14] 8,080 "
[16] 10,000 unissued Mort. £5,000
[17] 650 "
[18] 100 "
[19] 3,700 "
[21] 1,454 unissued.
[22] 36,000 "
[23] 785 "
[24] 50,000 "
[26] Silver Reserve Fund.
[27] Insurance Fund.
[28] Sundry Reserves.



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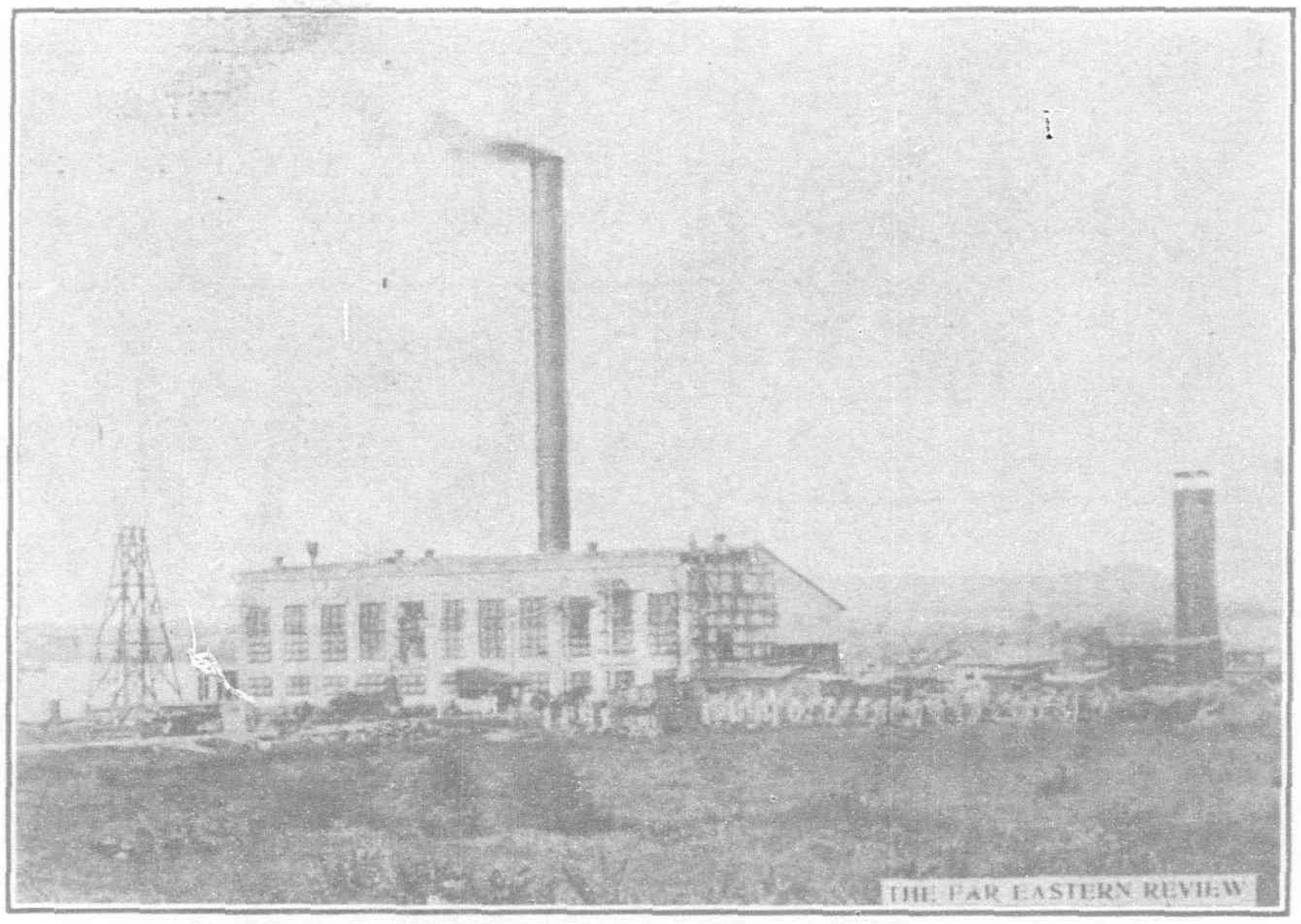

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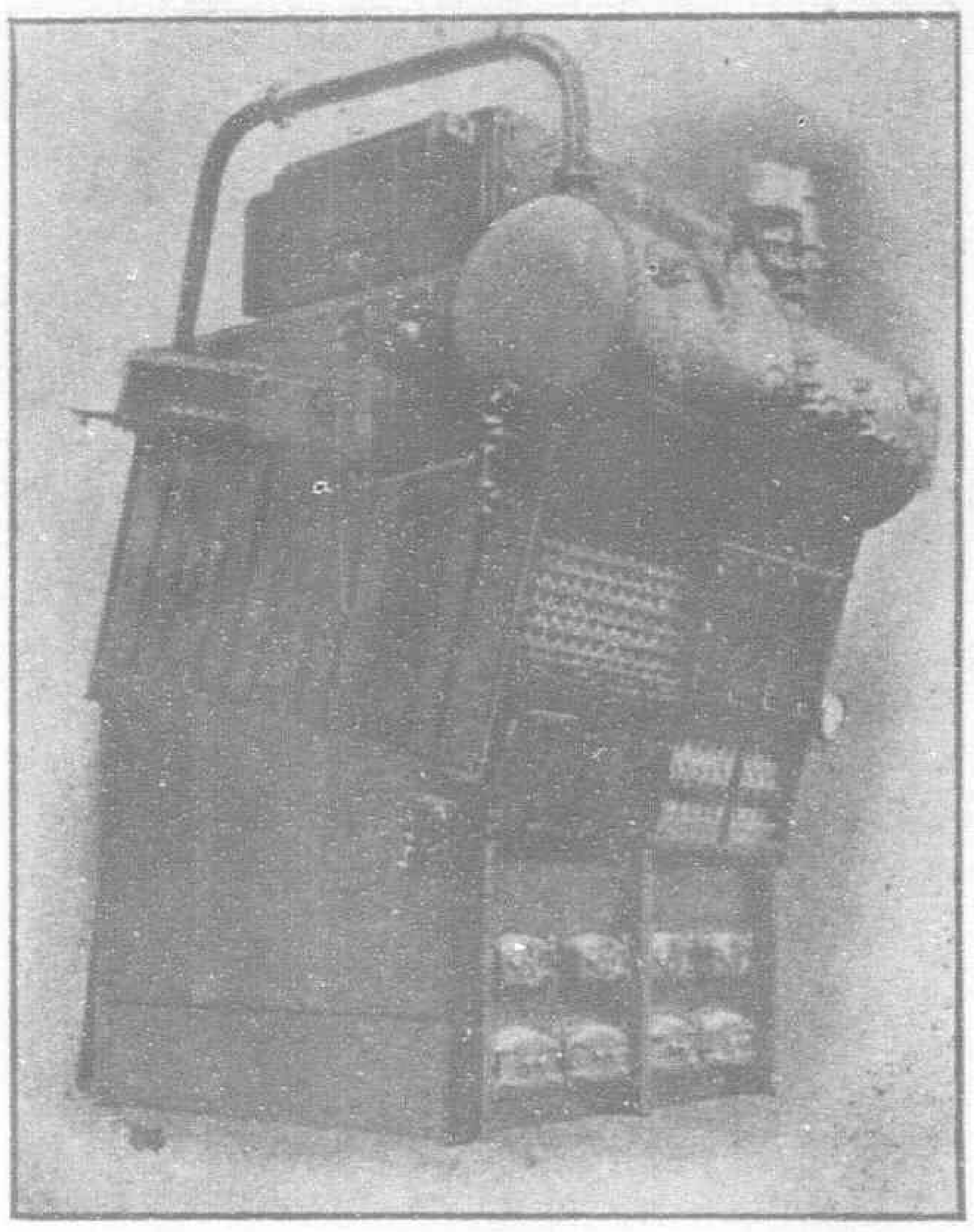

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4,500,000 HP. IN USE

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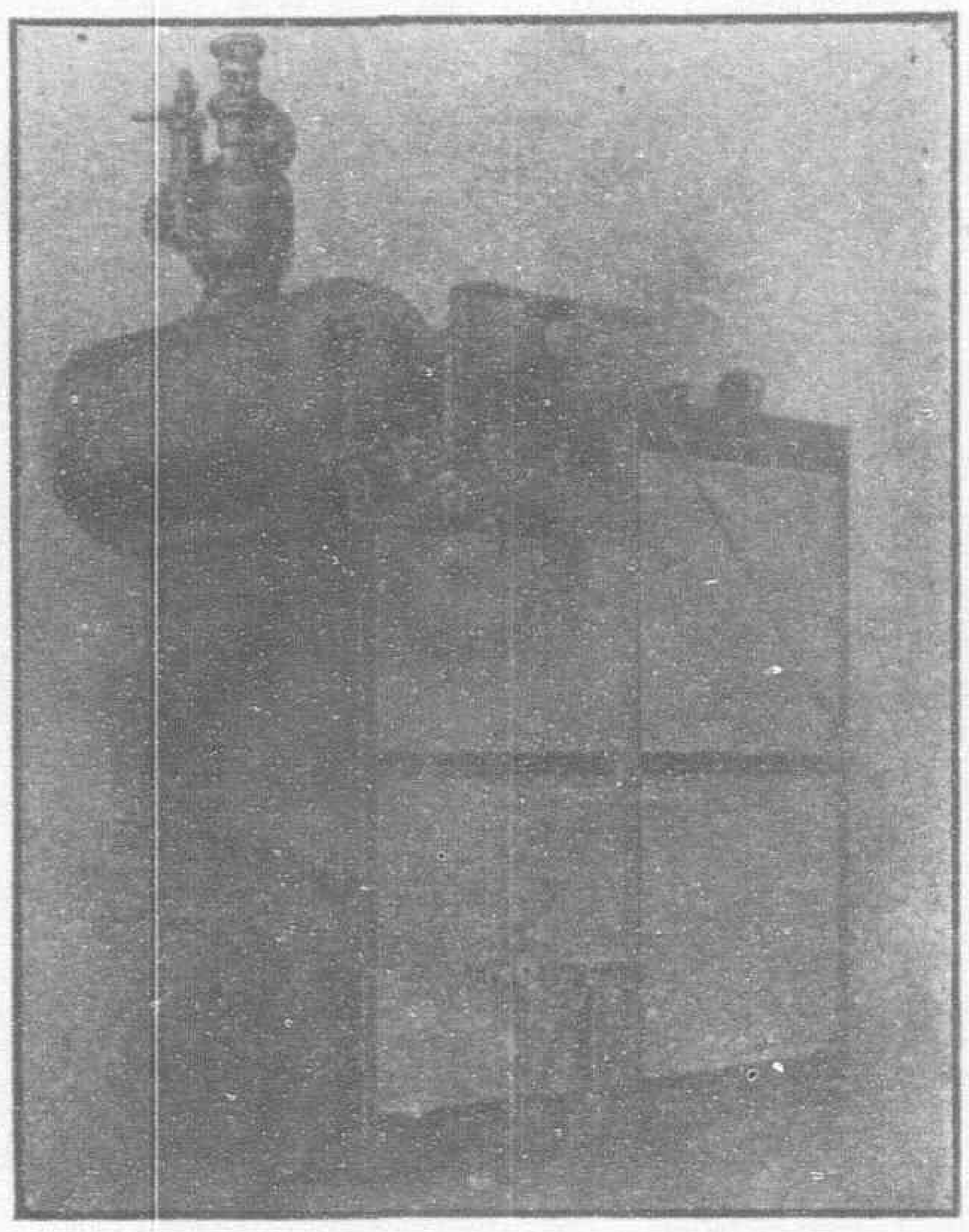

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Patent Water-Tube Boilers

Superheaters.
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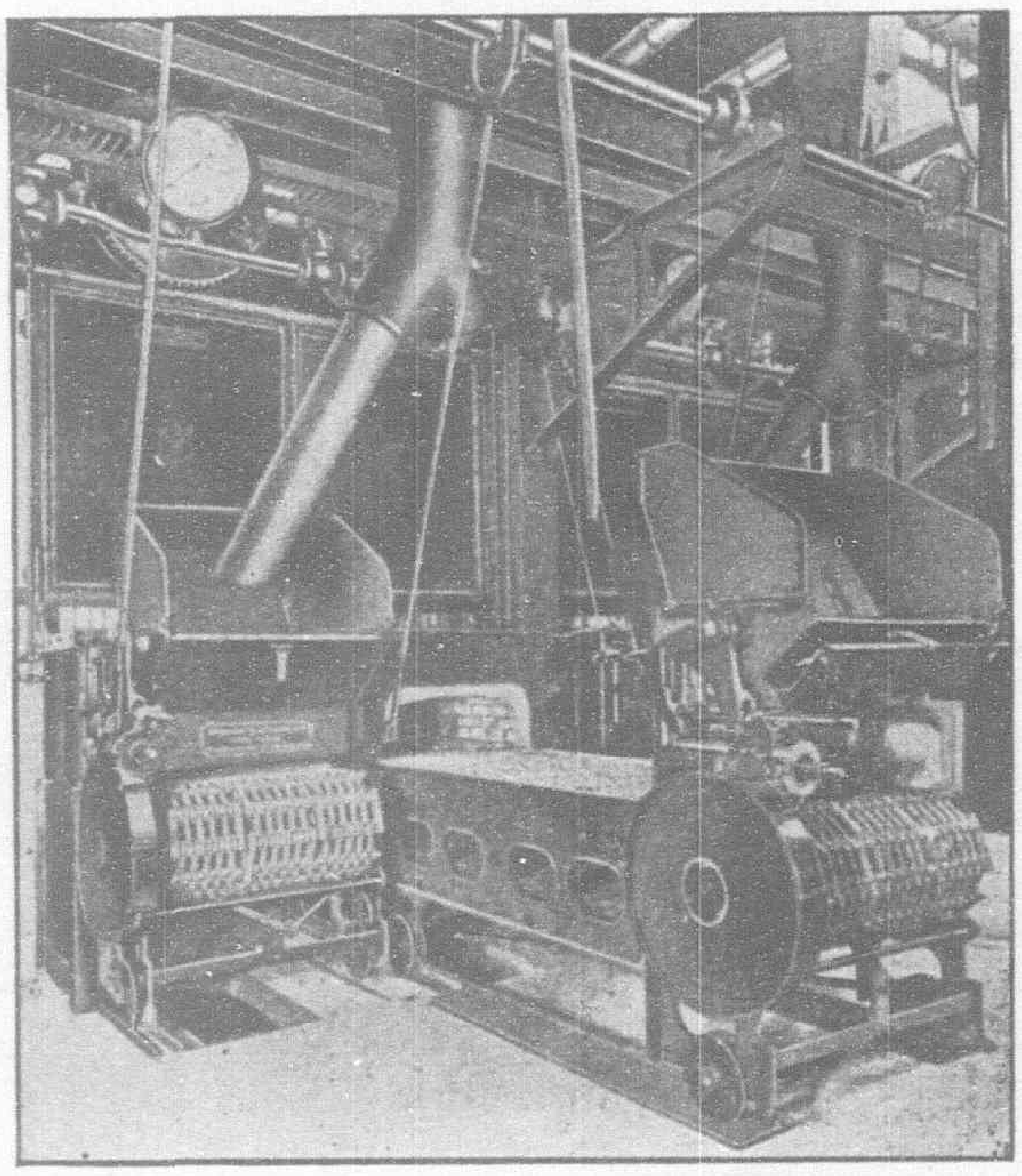

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Specially constructed for use in mountainous districts, and shipped in small packages of light weight, for easy transport by Cart, Coolies or Mule-back.

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Specially suitable for light draught and river steamers, where economy in weight and space is of importance.

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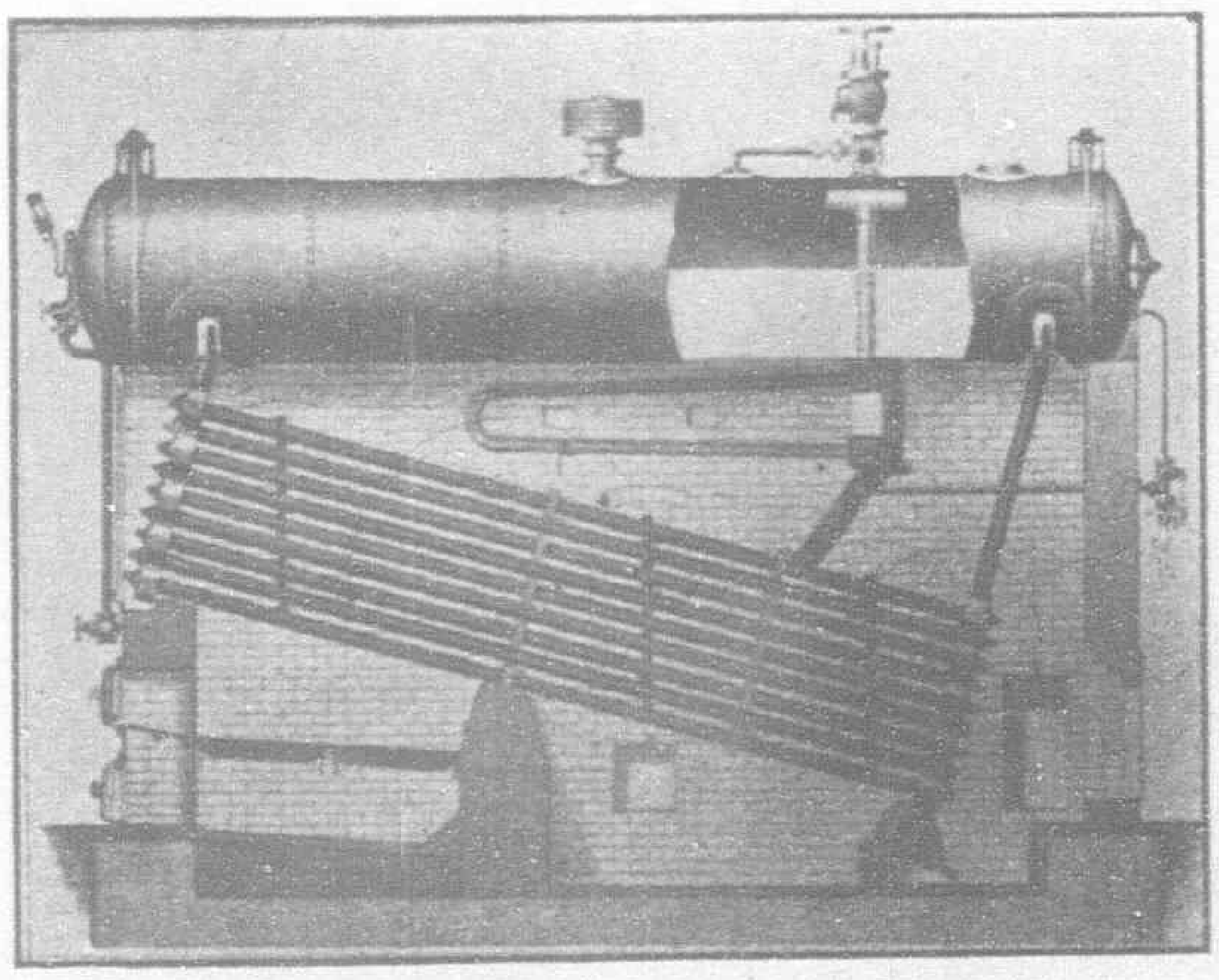
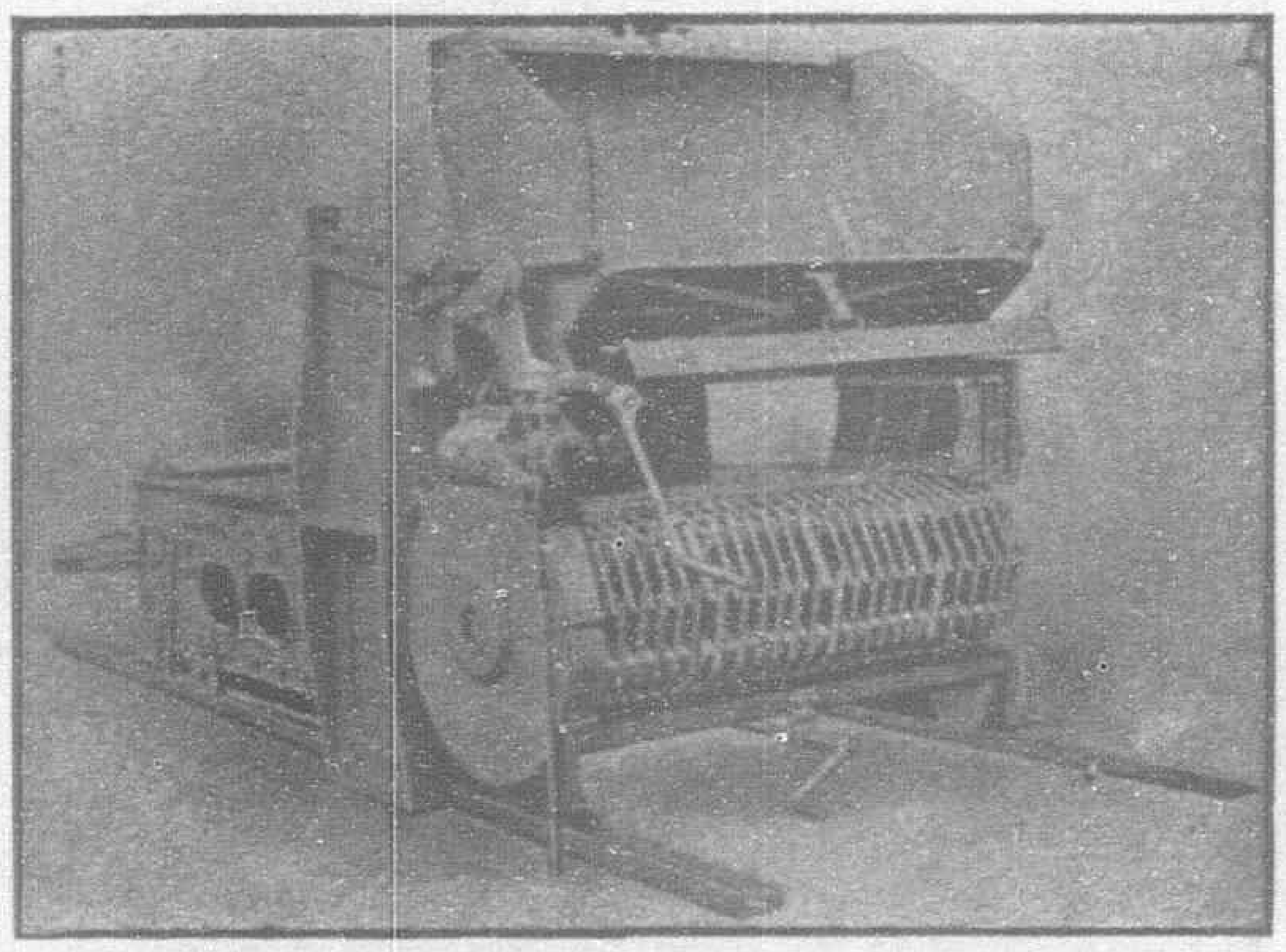


STANDARD LAND TYPE BOILER OF WHICH SOME 35,000 HAVE BEEN MADE



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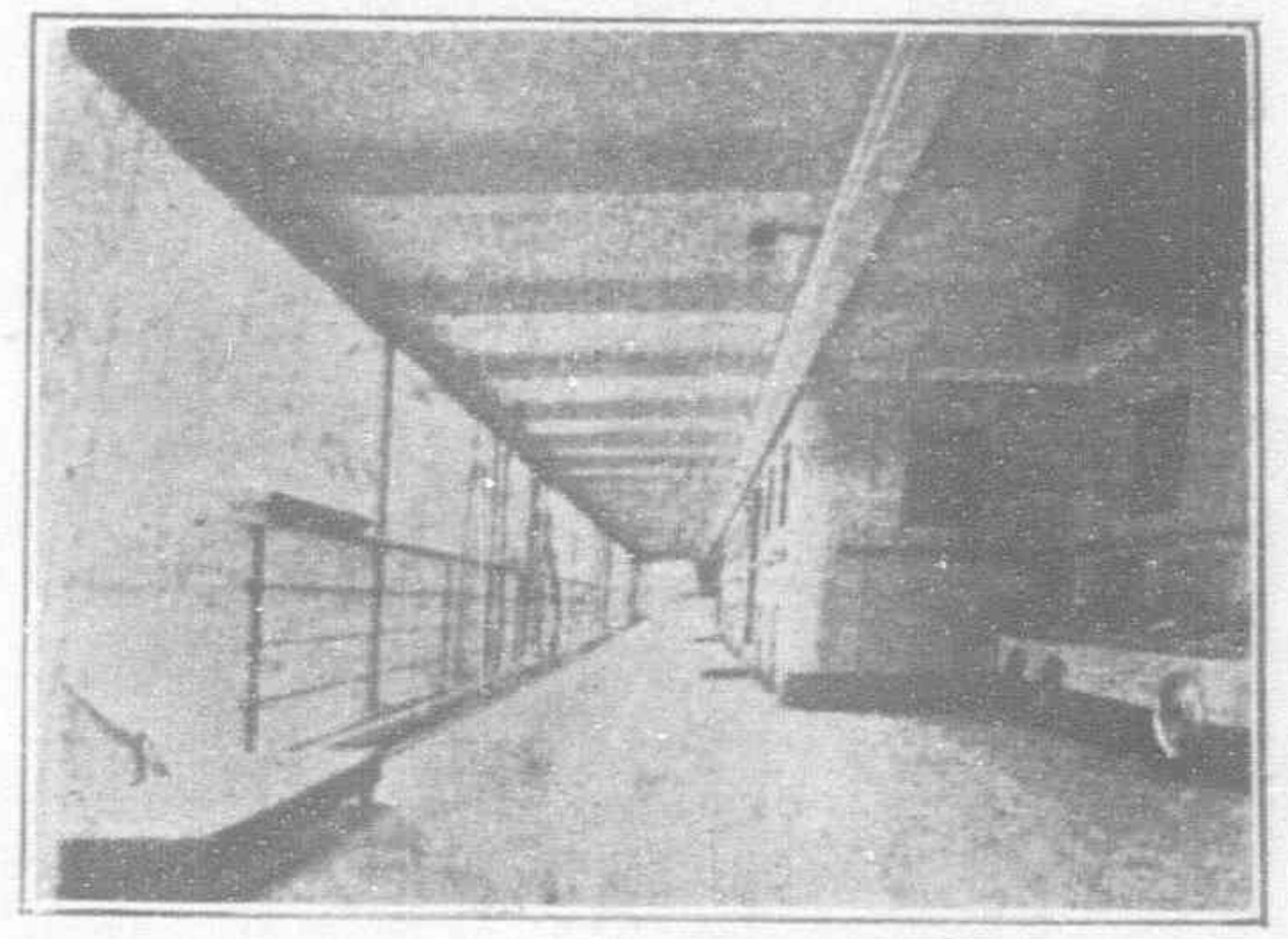

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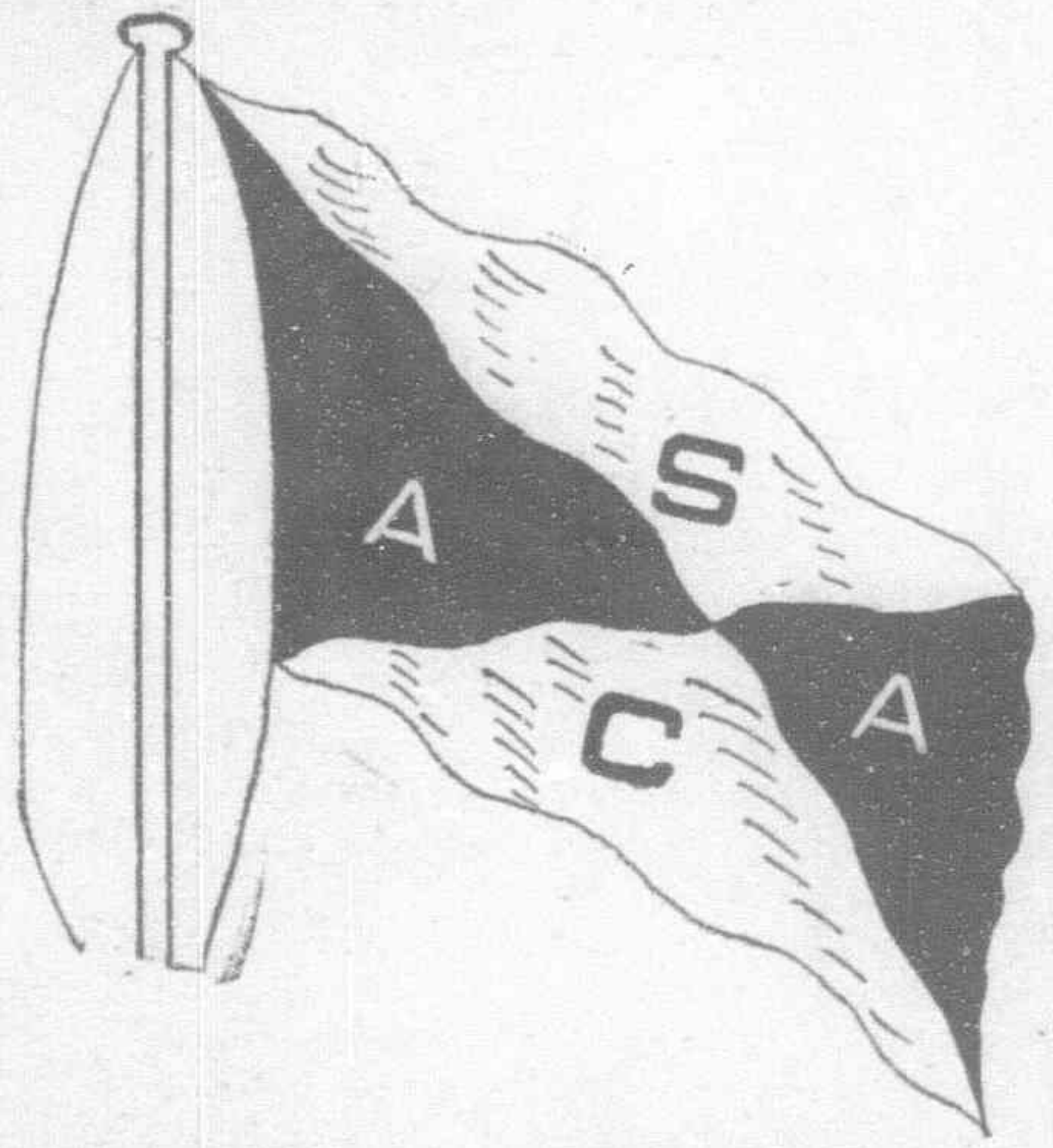

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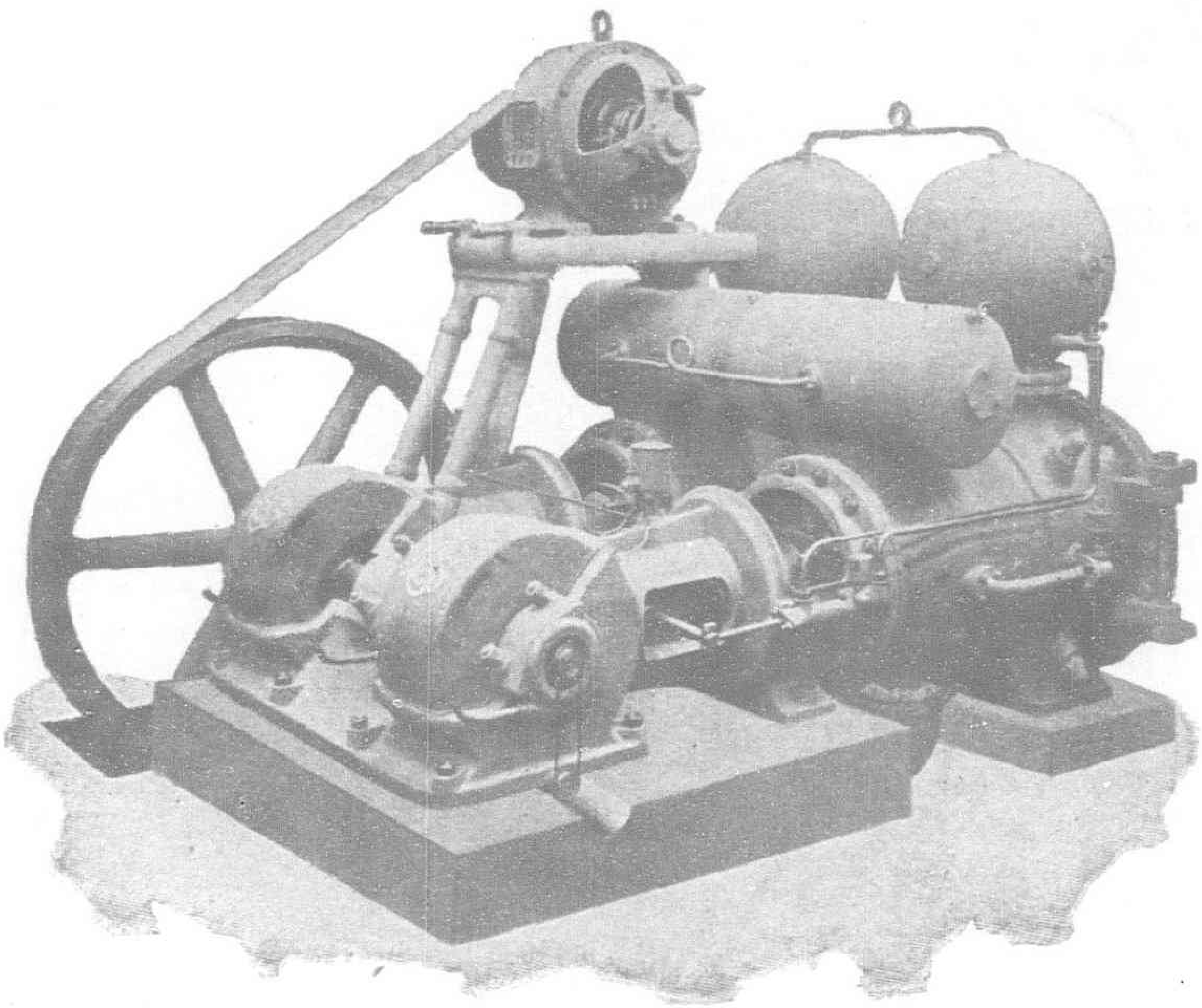

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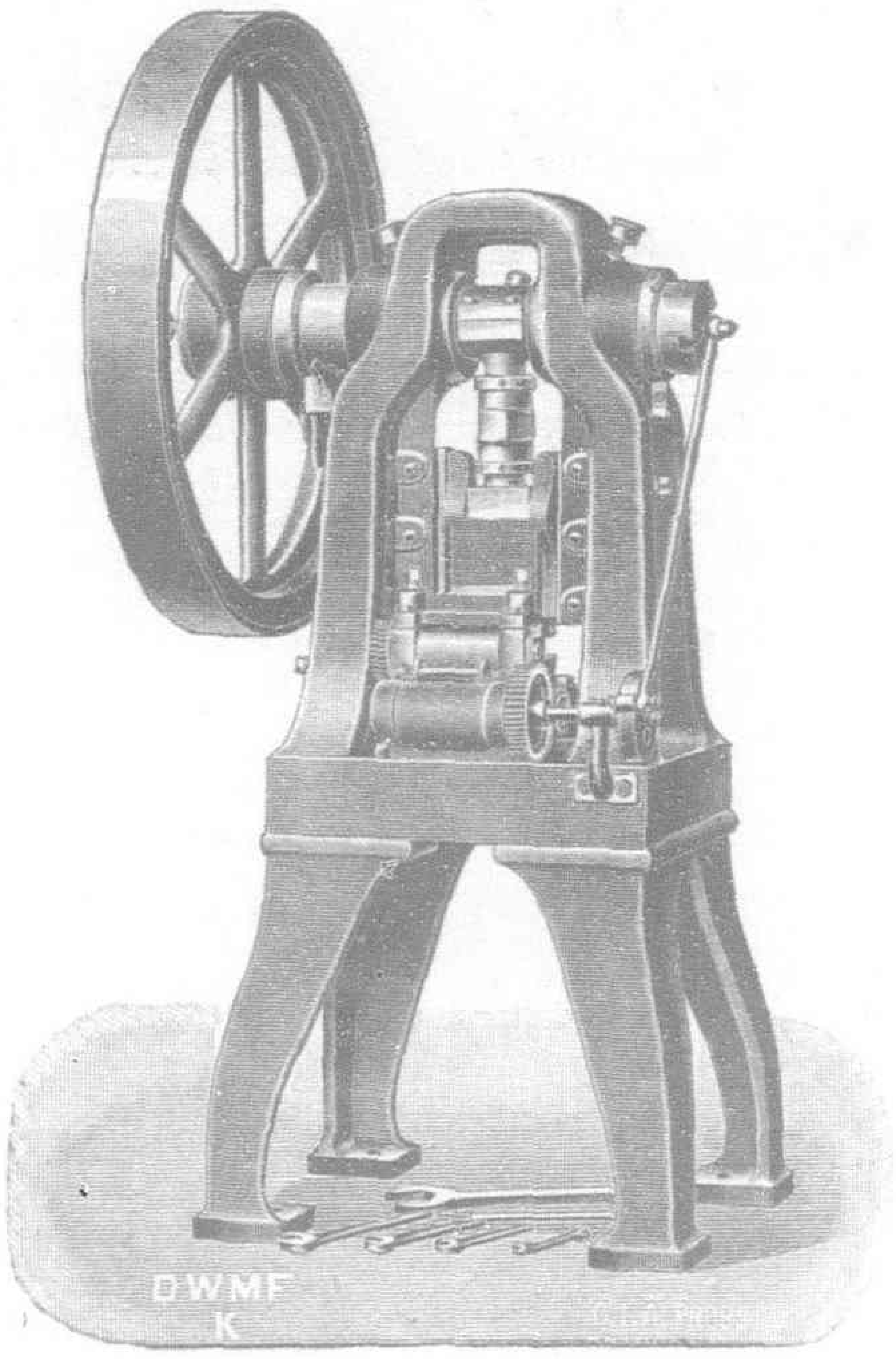

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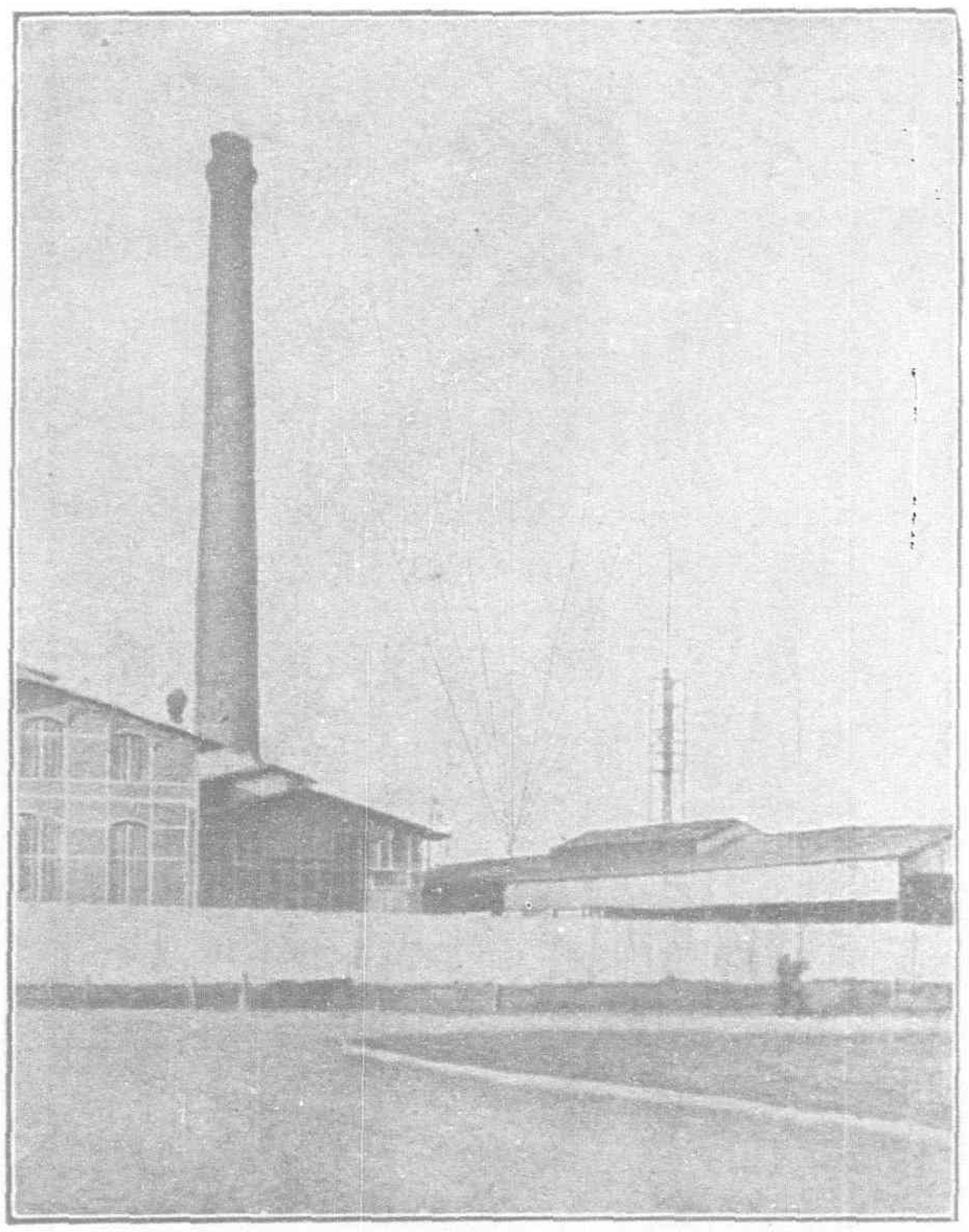

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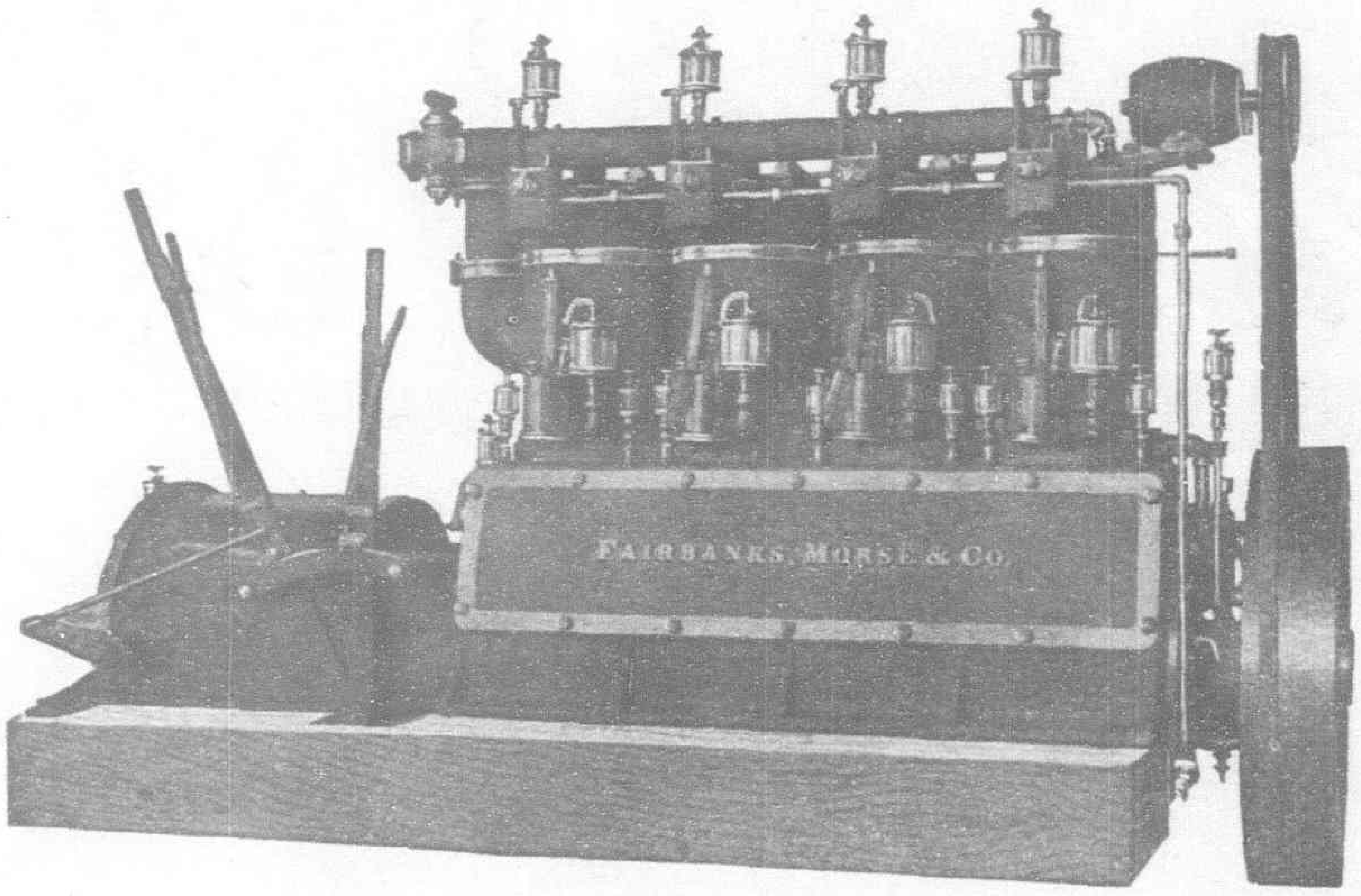

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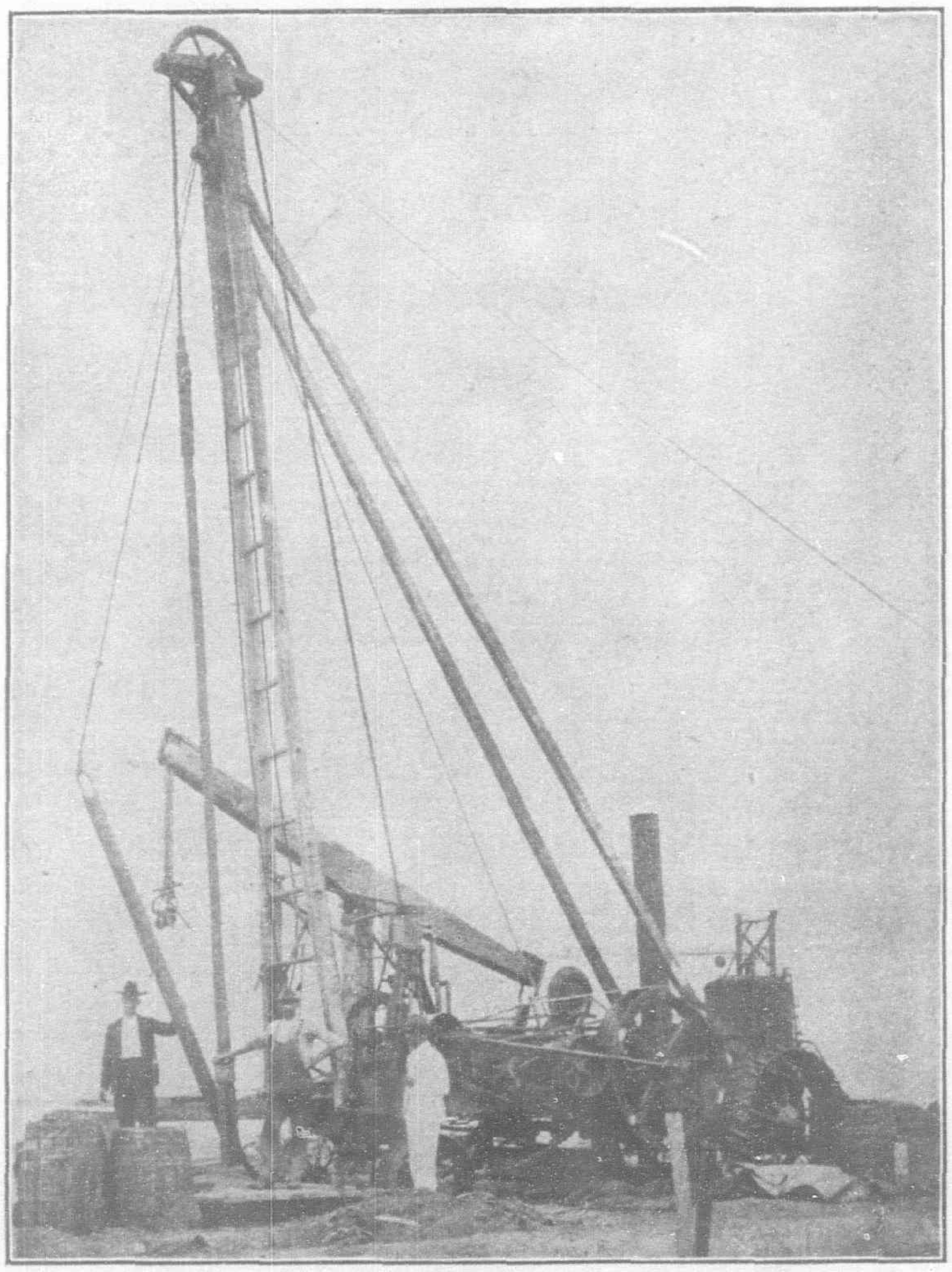

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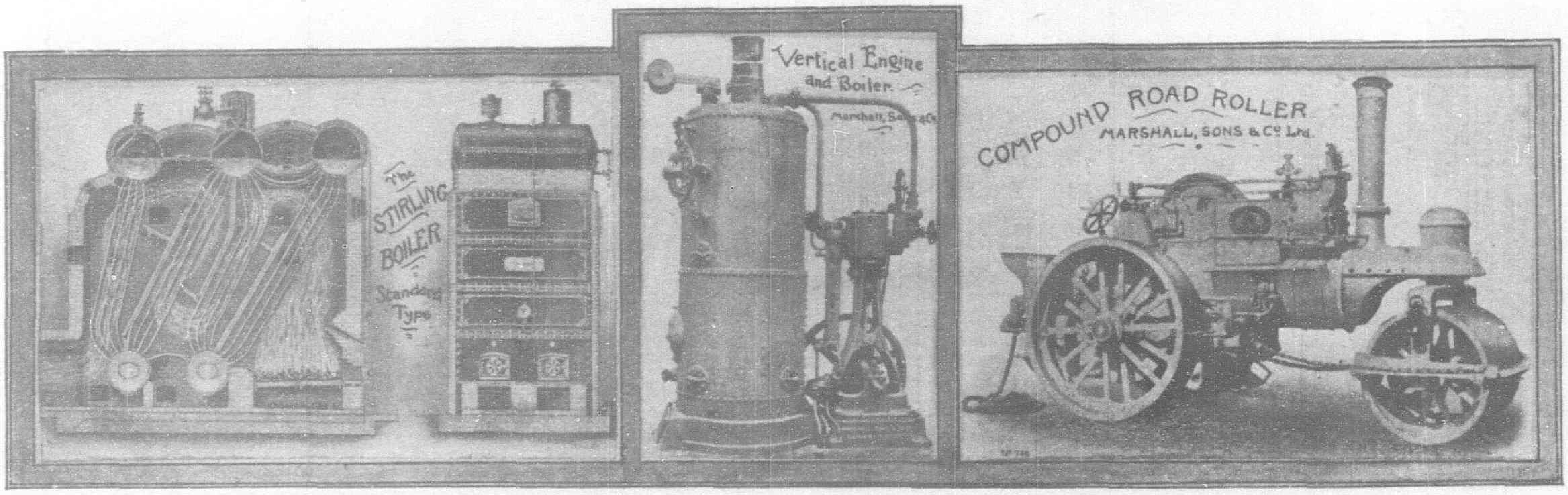

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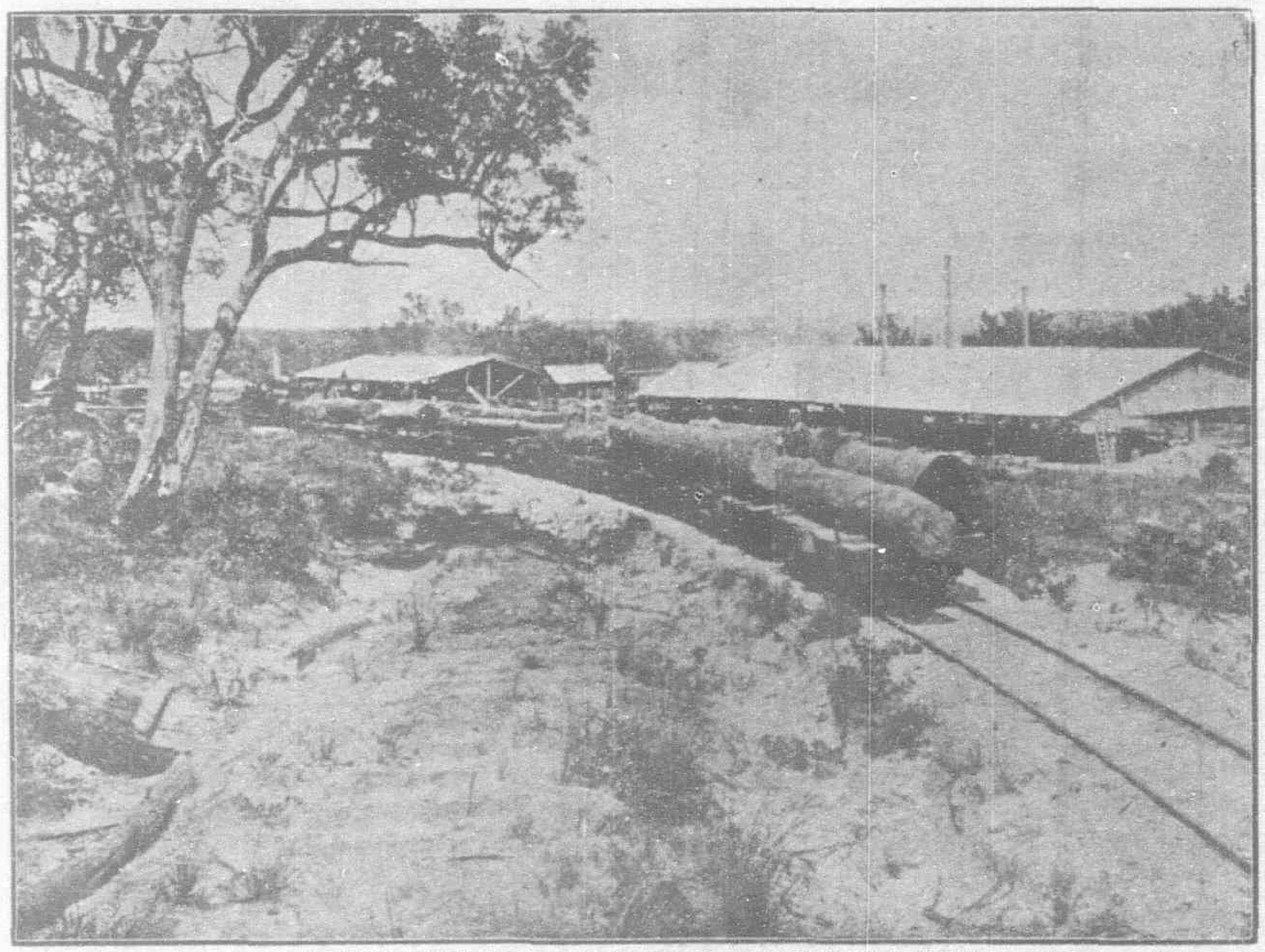

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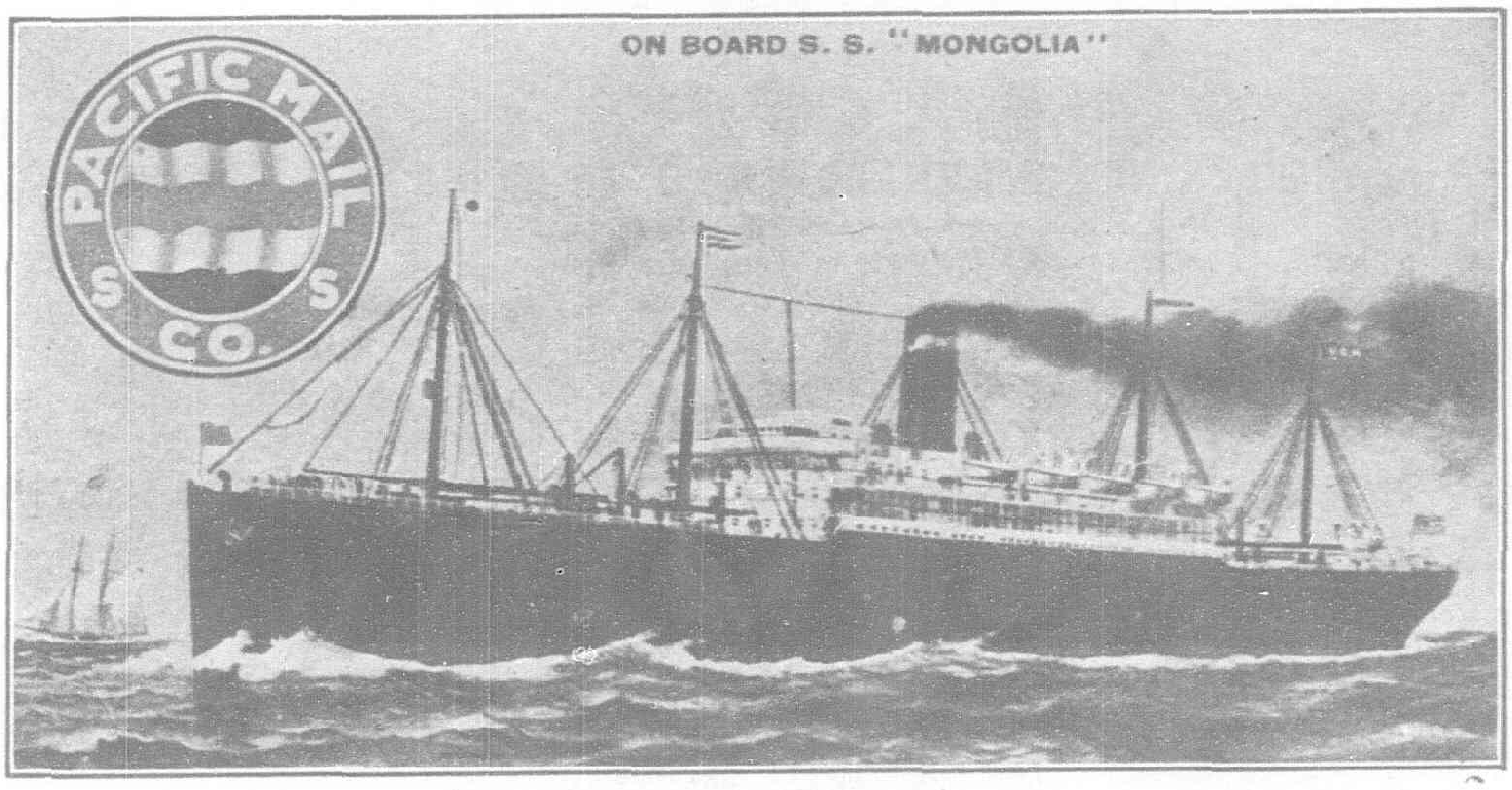
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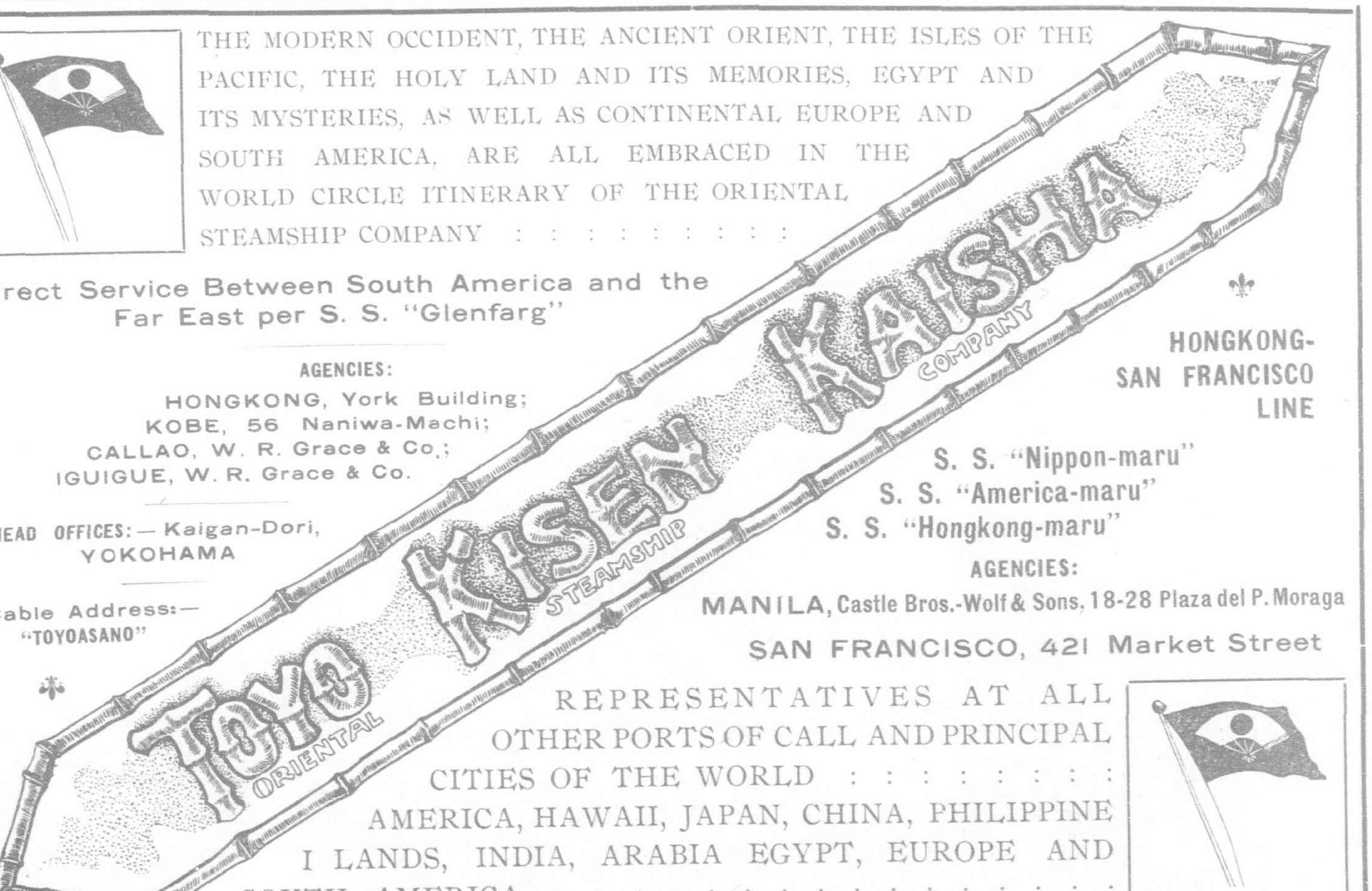

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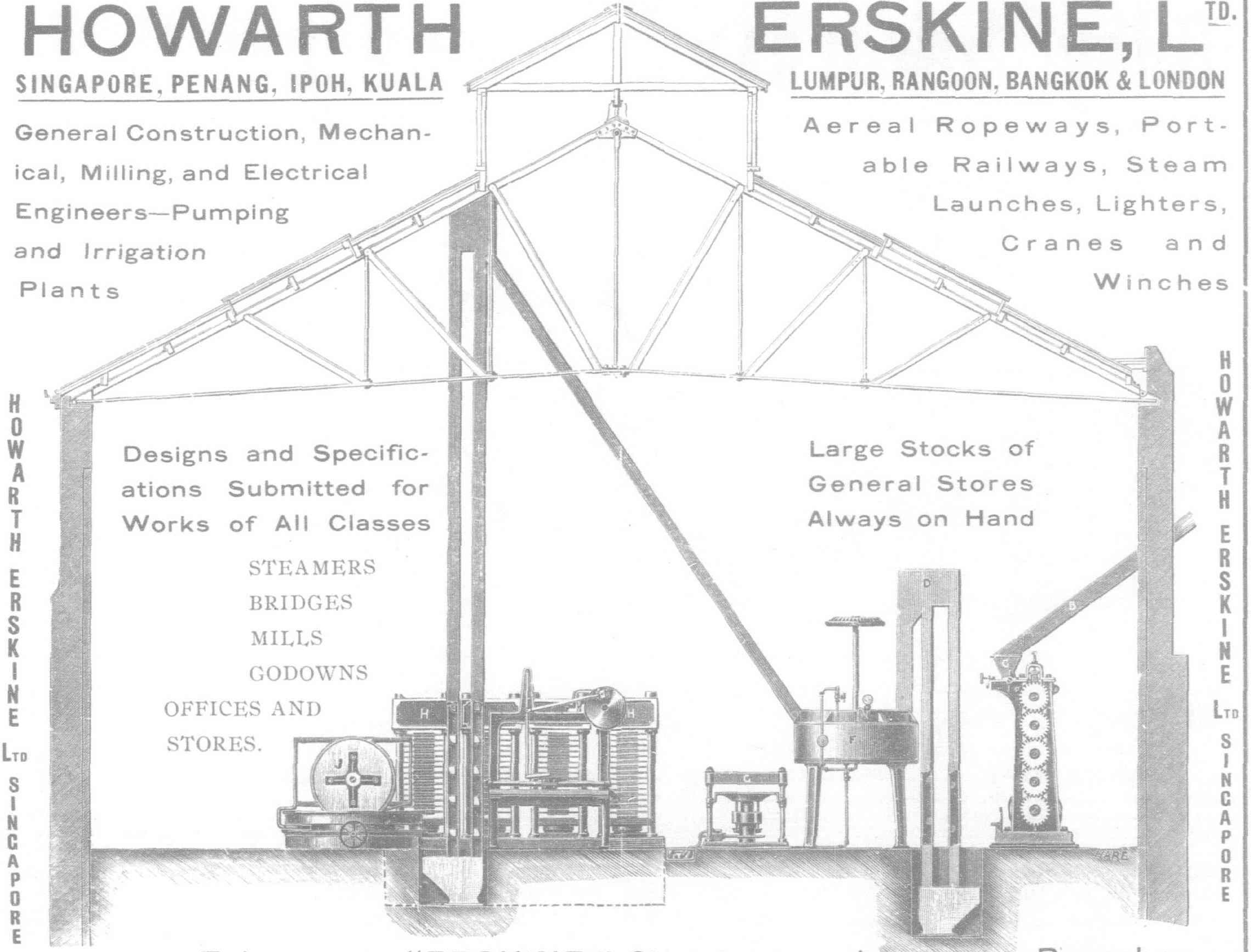

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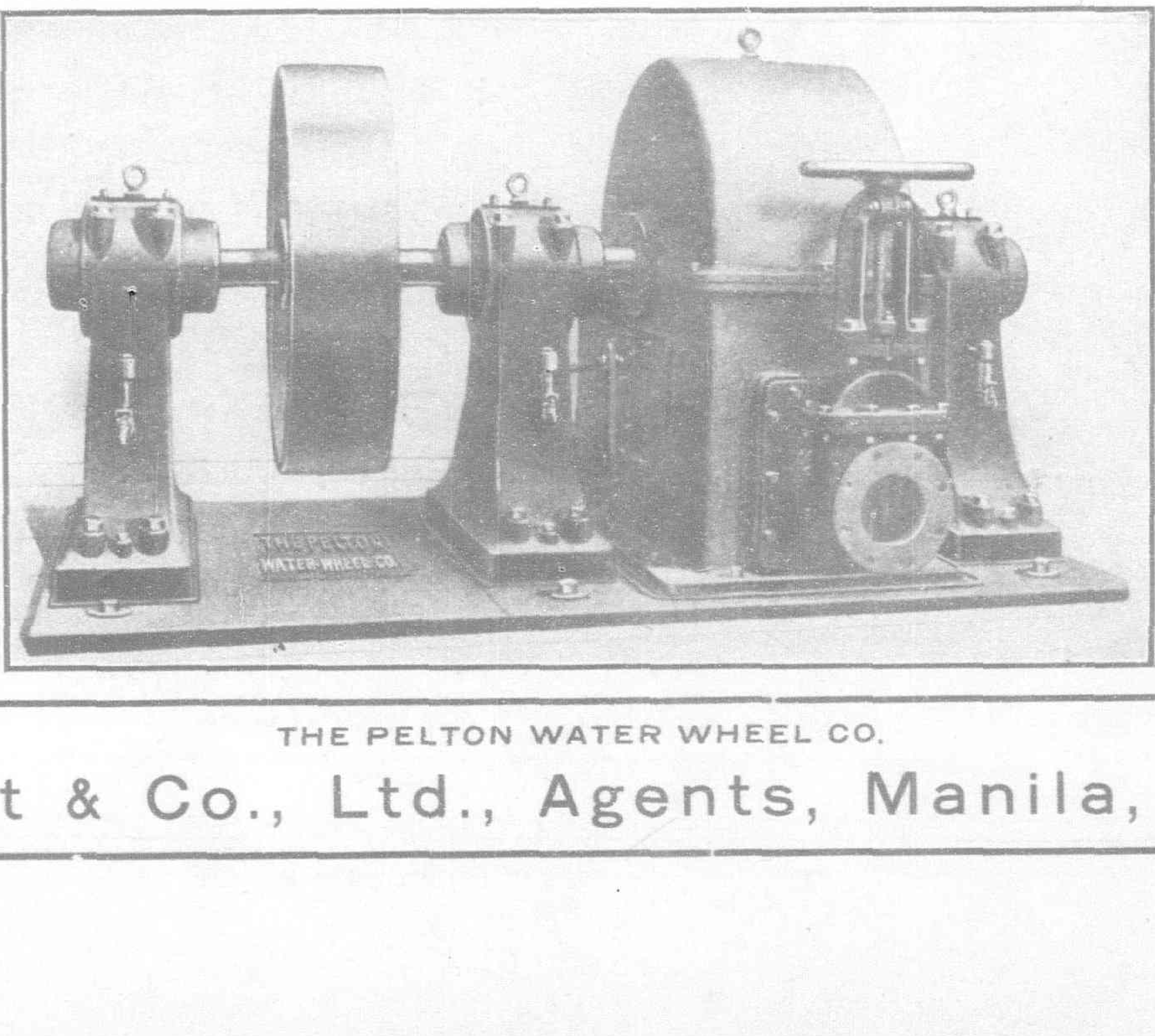

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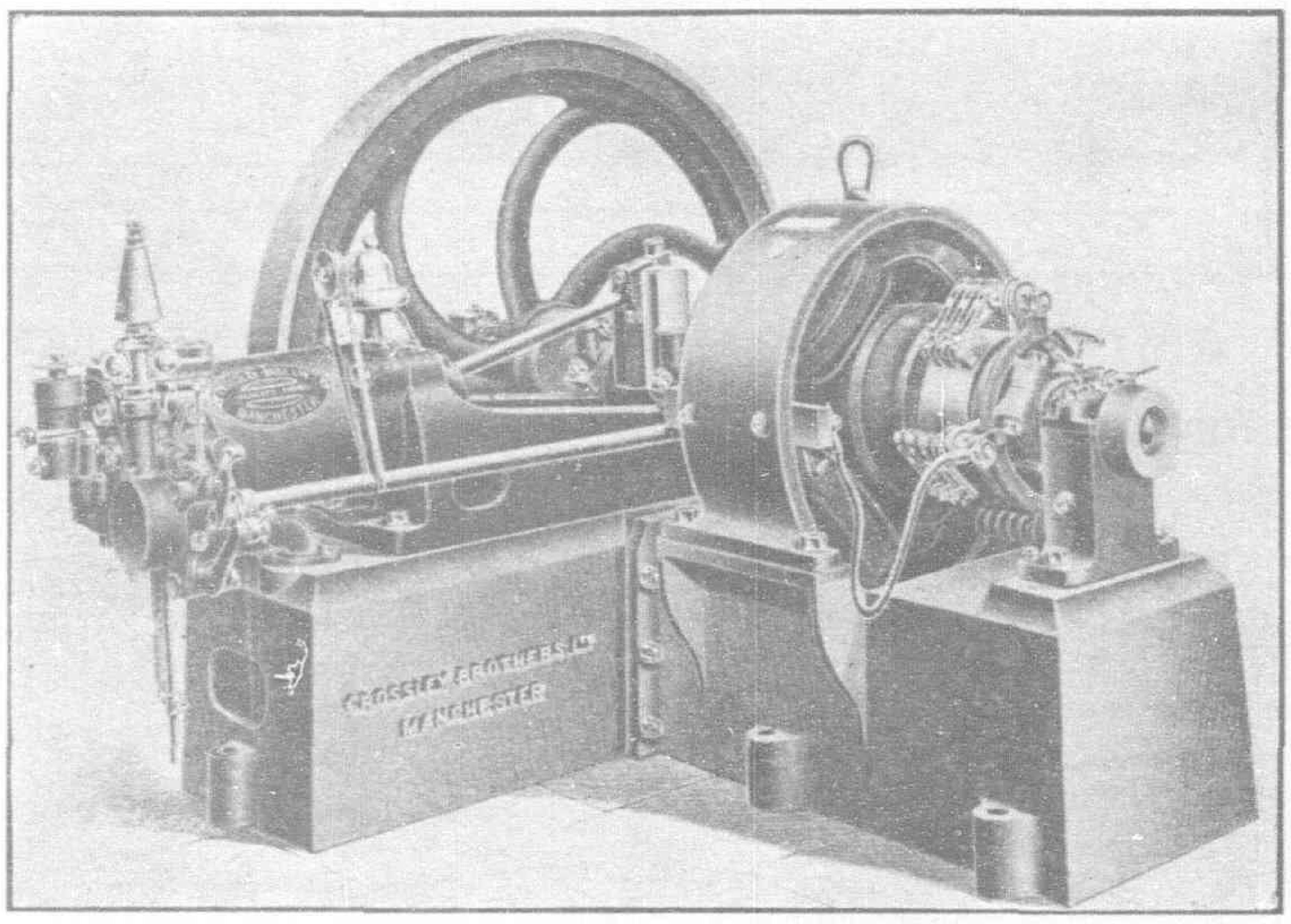

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(ESTABLISHED IN 1892.)

CODES USED:
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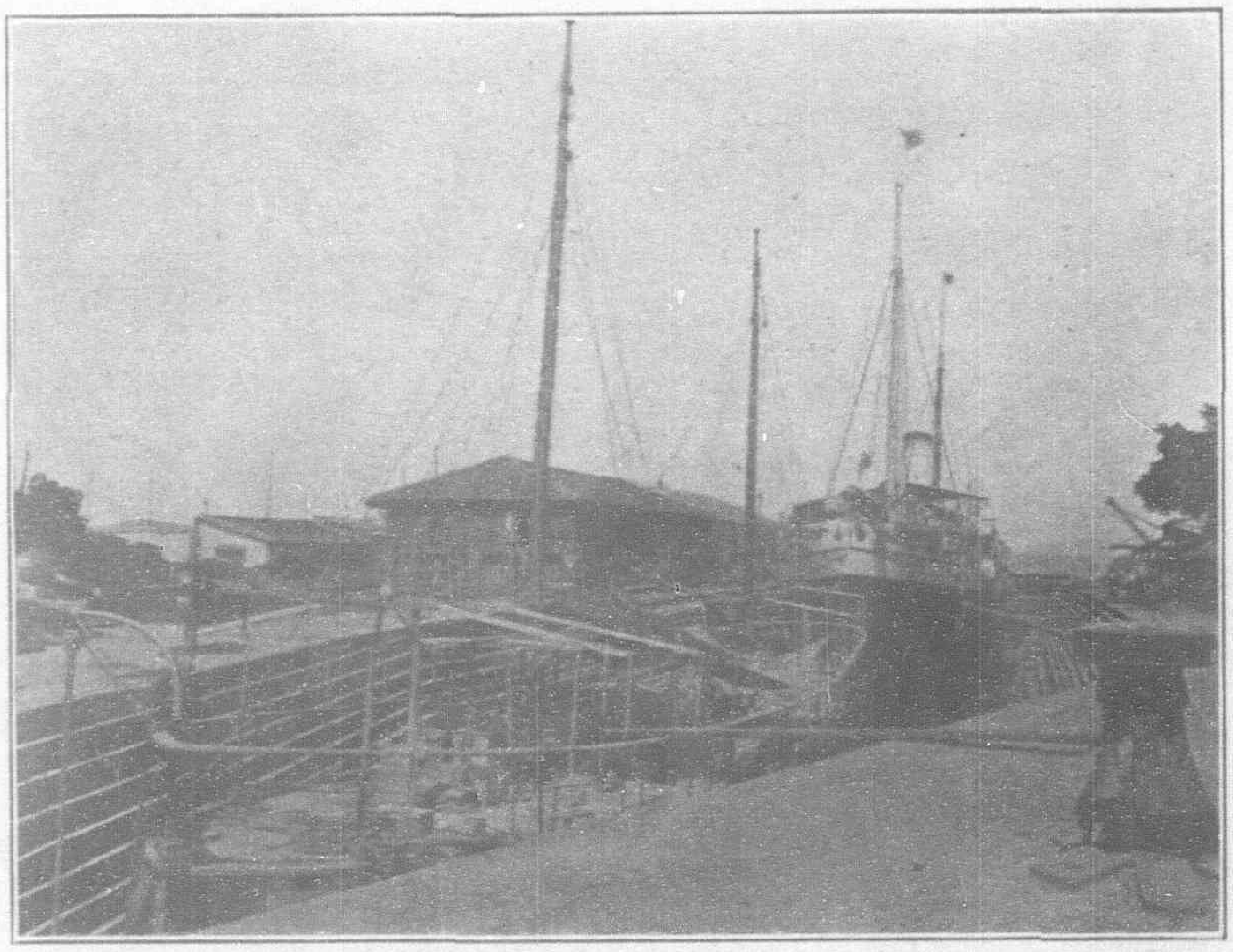
OUR GRANITE DOCK IS A TIDAL SLIPWAY AND HAS AN EXTREME LENGTH OF 360 FT., WITH A LENGTH ON BLOCKS OF 340 FT. IT CAN RECEIVE VESSELS UP TO 330 FT. BETWEEN PERPENDICULARS, 40 FT. BEAM AND A MEAN DRAFT OF 16½ FT. DURING SPRING TIDE, AND 12 FT. DURING NEAPS : : : : : : : :

THE MOST CONVENIENT AND SATISFACTORY DOCK FOR PHILIPPINE SHIPOWNERS, ON ACCOUNT OF LOCATION AND DISTANCE : : : : : : :



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OUR SLIPWAY IS EQUIPPED WITH THE LATEST MODERN PLANT, AND CARRIES A LARGE STOCK OF MATERIAL FOR THE REPAIR OF SHIPS, ENGINES AND BOILERS : : : : :

ANOTHER SPLENDID SLIPWAY IS NOW UNDER CONSTRUCTION, WHICH WILL TAKE UP VESSELS OF FROM 250 TO 300 TONS : : : : : : :

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THE COMPANY OWNS
THE COAL MINES NOW BEING WORKED AT TONGSHAN AND LINSI IN THE CHIHLI PROVINCE, AND THE COAL FIELD IN WHICH THEY ARE SITUATED. THE QUALITY OF THE COAL IS SUPERIOR TO ANY NOW BEING MINED IN THE FAR EAST, AND IS SUITABLE FOR STEAMING AND ALL OTHER PURPOSES. THE COKE PRODUCED IS EQUAL TO THE BEST ENGLISH COKE AND COMMANDS A READY MARKET

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THE COMPANY HAS
FACILITIES FOR LOADING COAL AT THE ICE FREE PORT OF CHIN-WANG-TAO, WITH WHICH IT IS IN RAILWAY COMMUNICATION

THE IMPERIAL RAILWAYS OF NORTH CHINA AND THE LUHAN RAILWAY USE THIS COAL FOR THEIR LOCOMOTIVES, AND AN EXTENSIVE BUNKERING BUSINESS IS DONE WITH STEAMERS

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TONGSHAN CEMENT-WORKS, NORTH-CHINA
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TONGSHAN
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IS MANUFACTURED FROM THE BEST RAW MATERIALS BY COMPLETE AND MODERN MACHINERY UNDER EXPERT SUPERVISION. UNIVERSALLY USED THROUGHOUT NORTH CHINA AND HAS SECURED THE HIGHEST APPROVAL FOR ITS GOOD QUALITY, CONSTANCY OF VOLUME AND FINENESS : :

TONGSHAN
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WAS AWARDED A SILVER MEDAL AT ST. LOUIS EXPOSITION, DECEMBER, 1904 : :

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Equal in quality and finish to best European Make, Large Variety of Artistic Designs for Center and Border Tiles to meet any requirement.

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The excellent seams of fireclay in the neighborhood of Tongshan enables us to place in the Chinese market a very superior firebrick at about one fourth the cost of the imported article. Output 50,000 bricks per day. Arch and cupola bricks, boiler seating blocks, and special shapes, made to order.

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For Kitchens, Verandas, Public Buildings, etc., etc., etc.,
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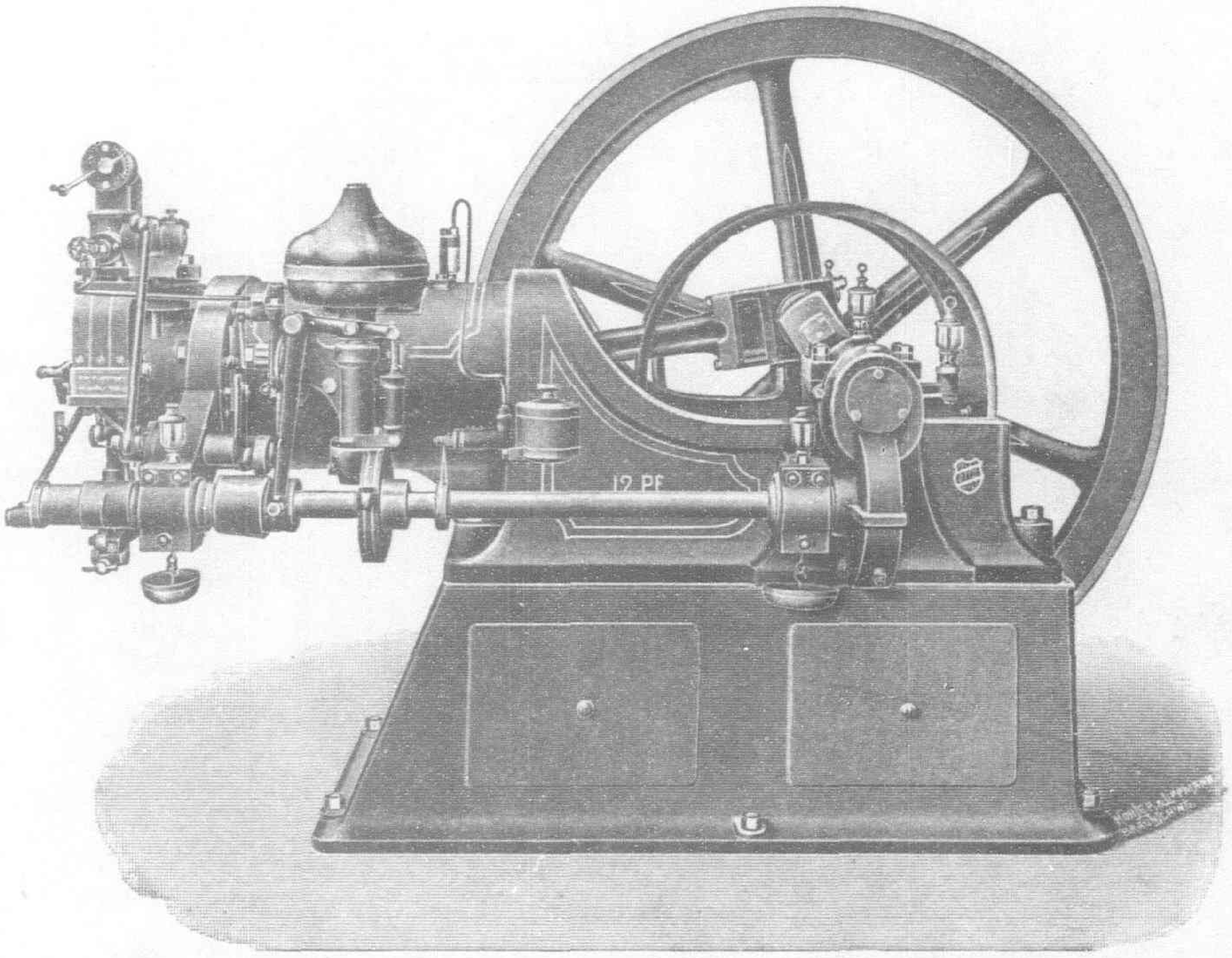
First and Oldest Gas Engine Works

This Engine is the result of over 40 years' experience and experiment

280 Prize Medals and Diplomas. Over 75000 Engines in use, aggregating 450000 HP.



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Original "OTTO" Oil Engine

with positively controlled valve motion and electric ignition.

These engines may be seen and inspected at any time at our

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A product of the Philippines.

Bottled by American enterprise at Los Baños.

Guaranteed absolutely pure and is the most delicious mineral water in the World.

IT COSTS LESS THAN IMPORTED WATERS

Order from any jobber or from

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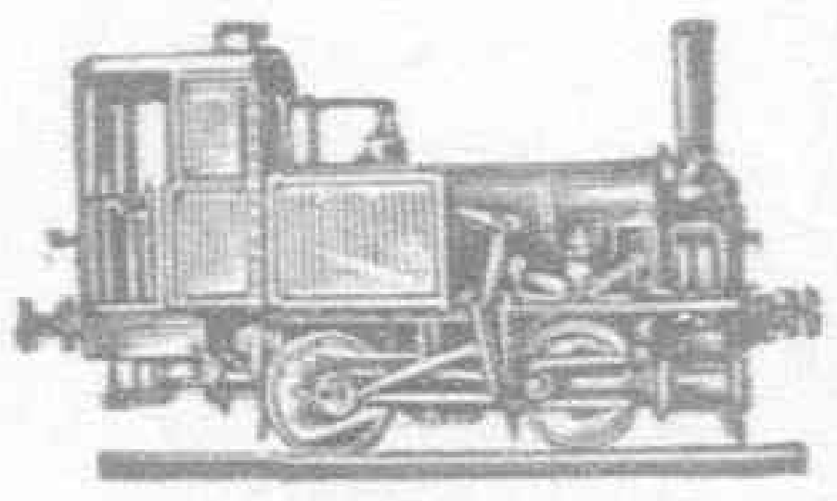

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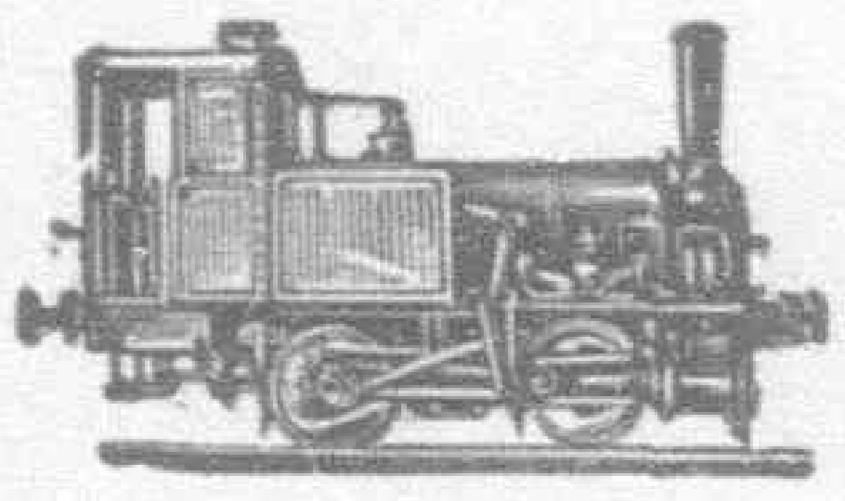

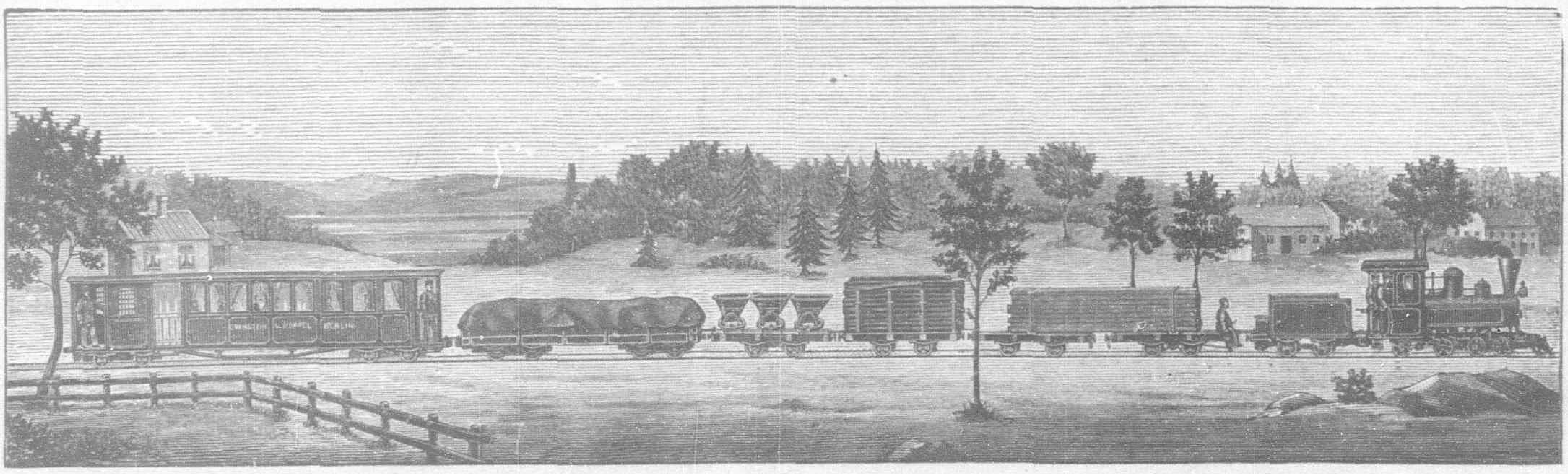

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INDUSTRIAL, CONTRACTOR'S AND PLANTATION RAILROADS: PORTABLE TRACK WITH ACCESSORIES A SPECIALTY

STEEL RAILS, SLEEPERS, SWITCHES, FROGS, TURNTABLES,
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Special LOCOMOTIVE Works

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IMPROVED ROLLER BEARINGS
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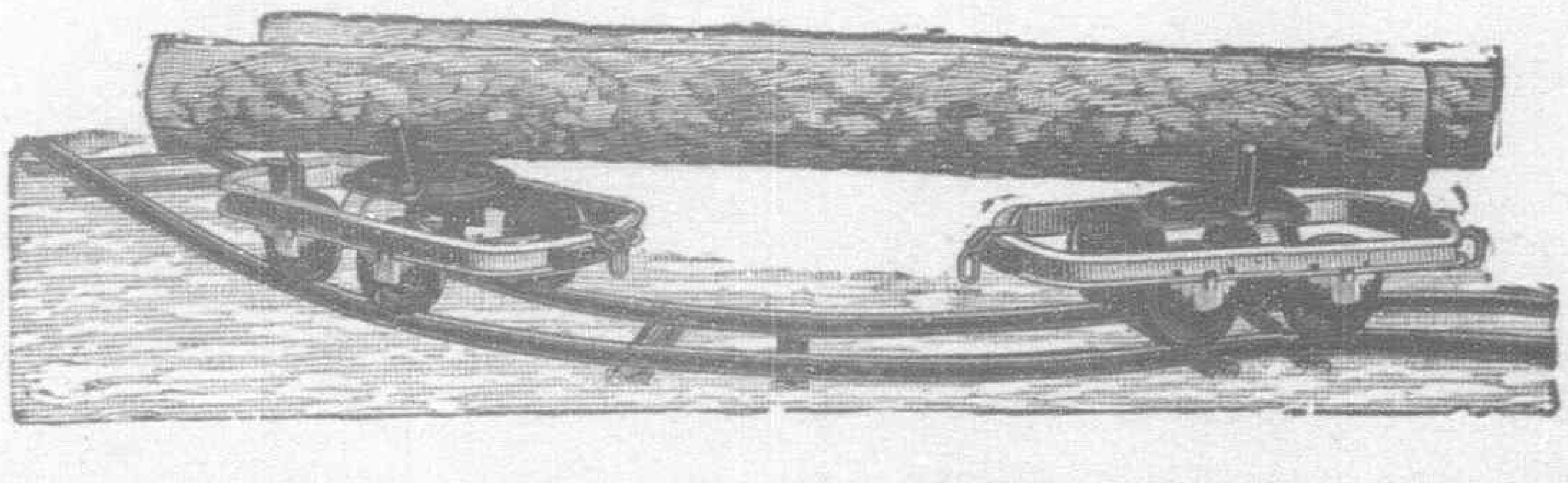

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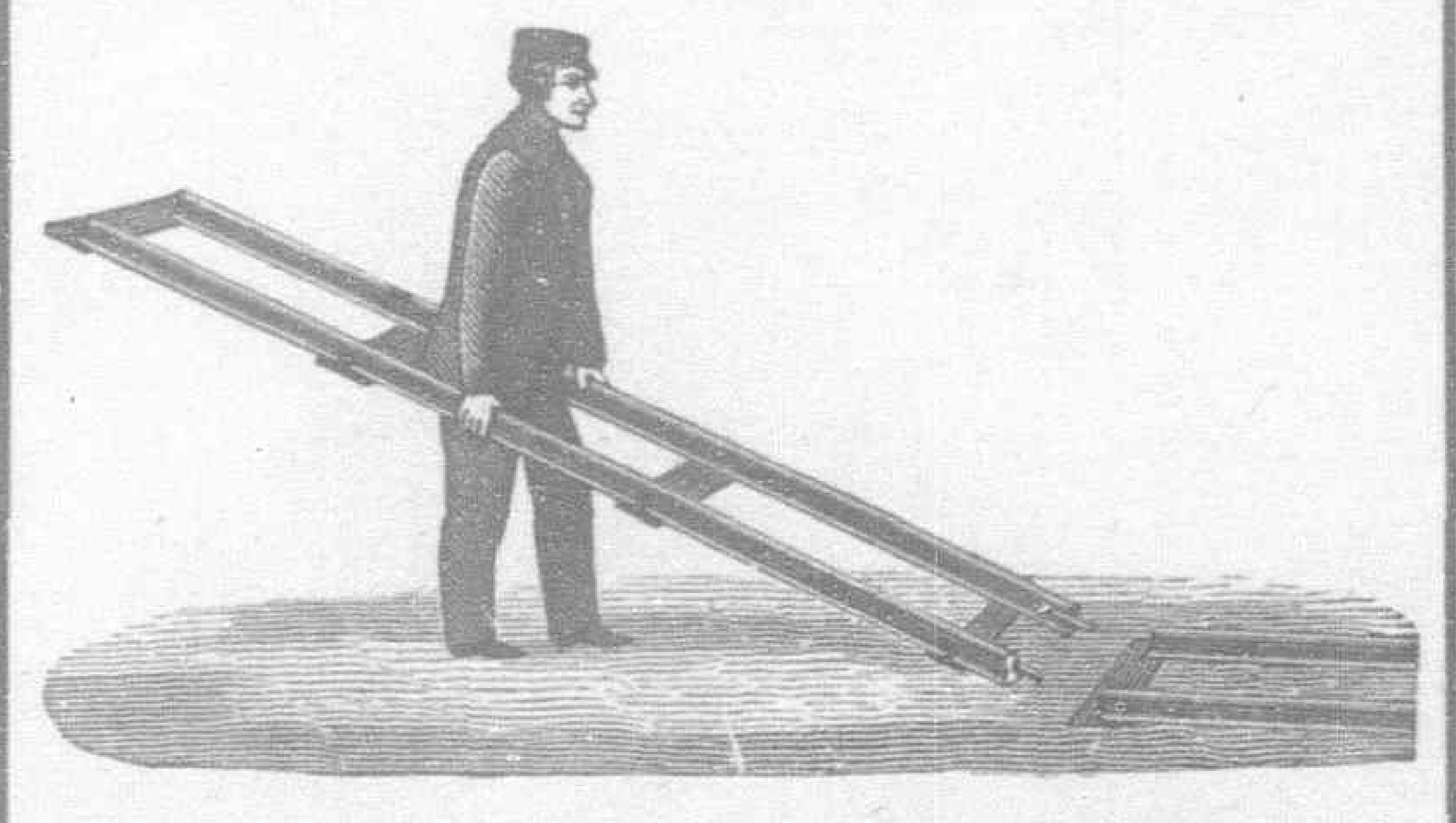

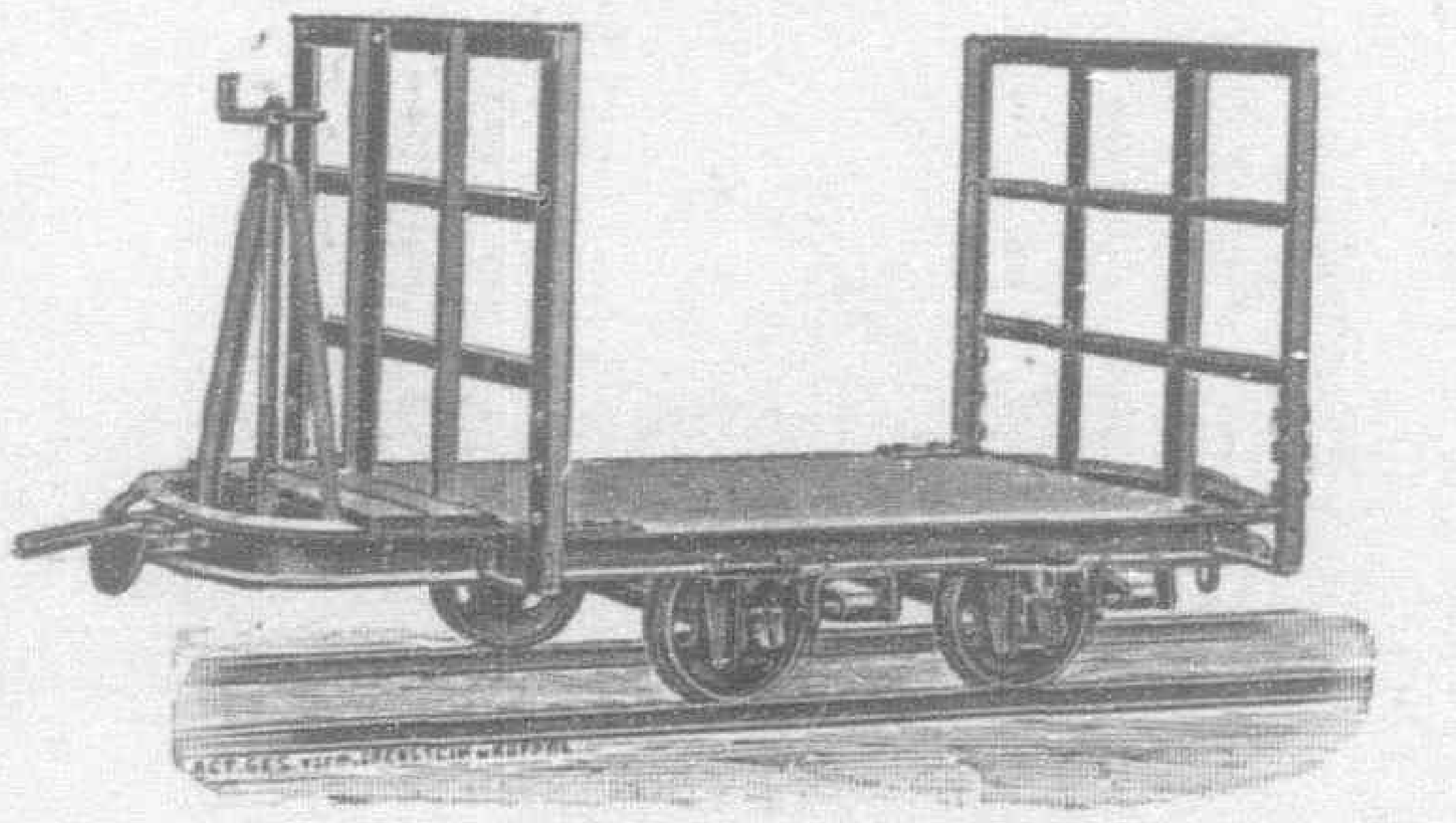

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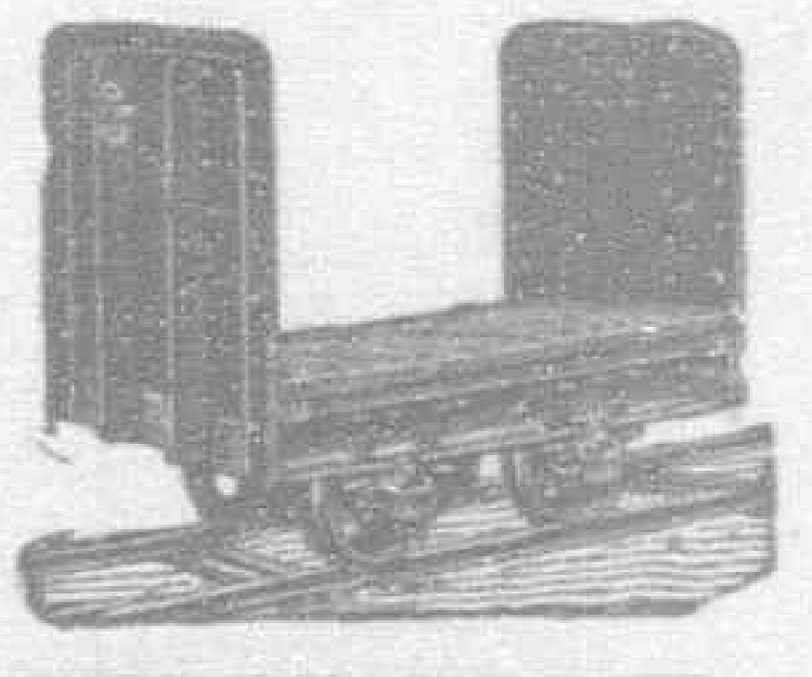

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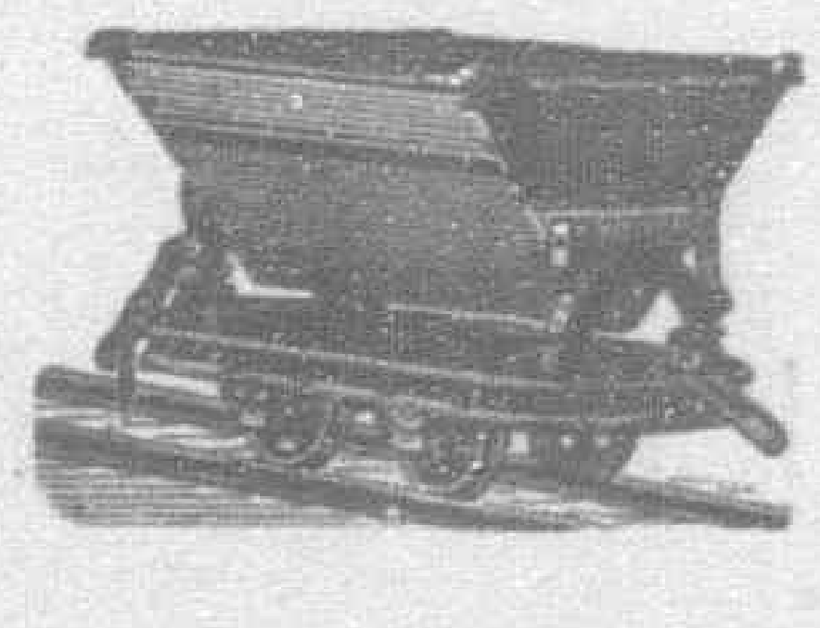

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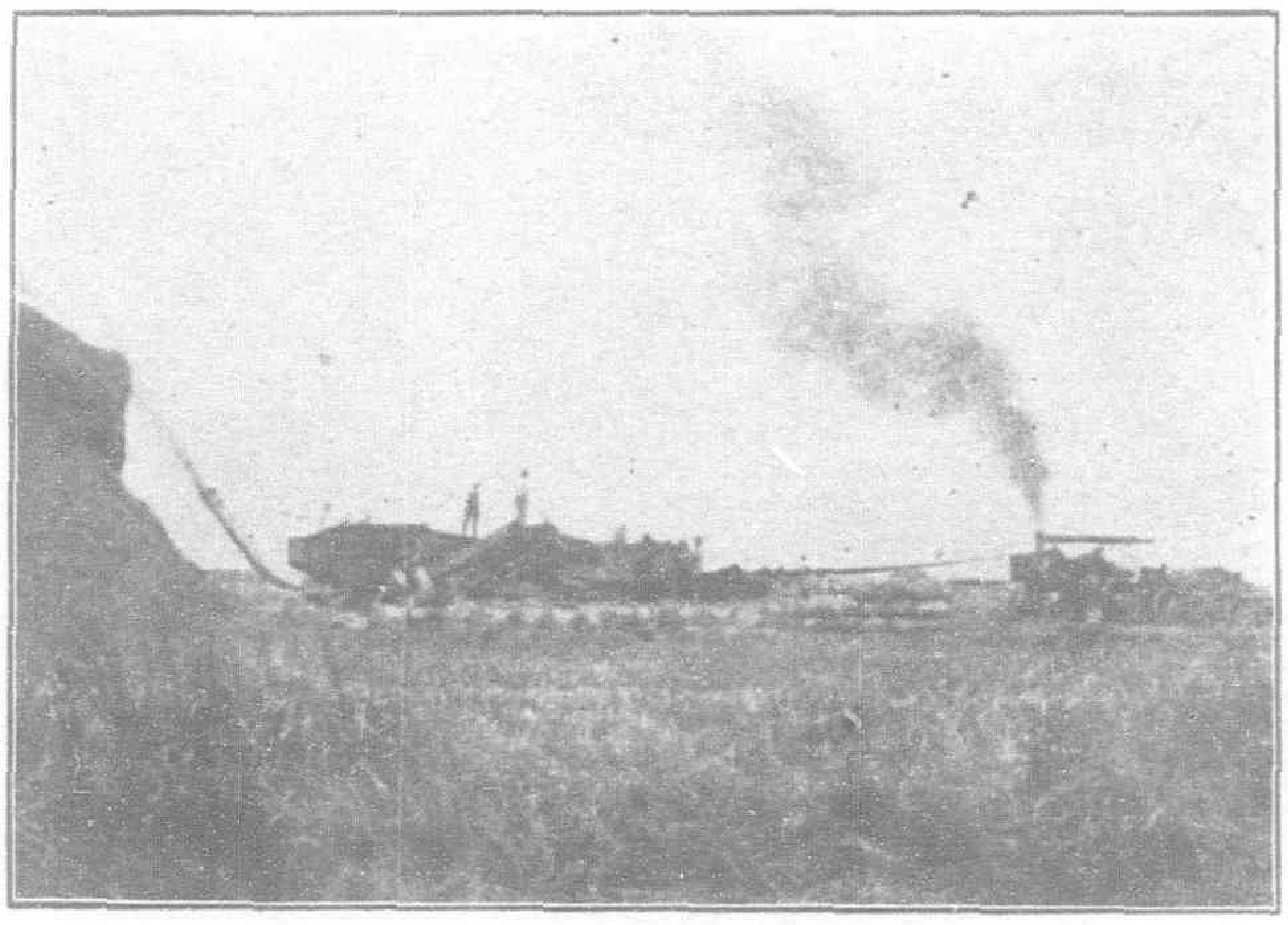

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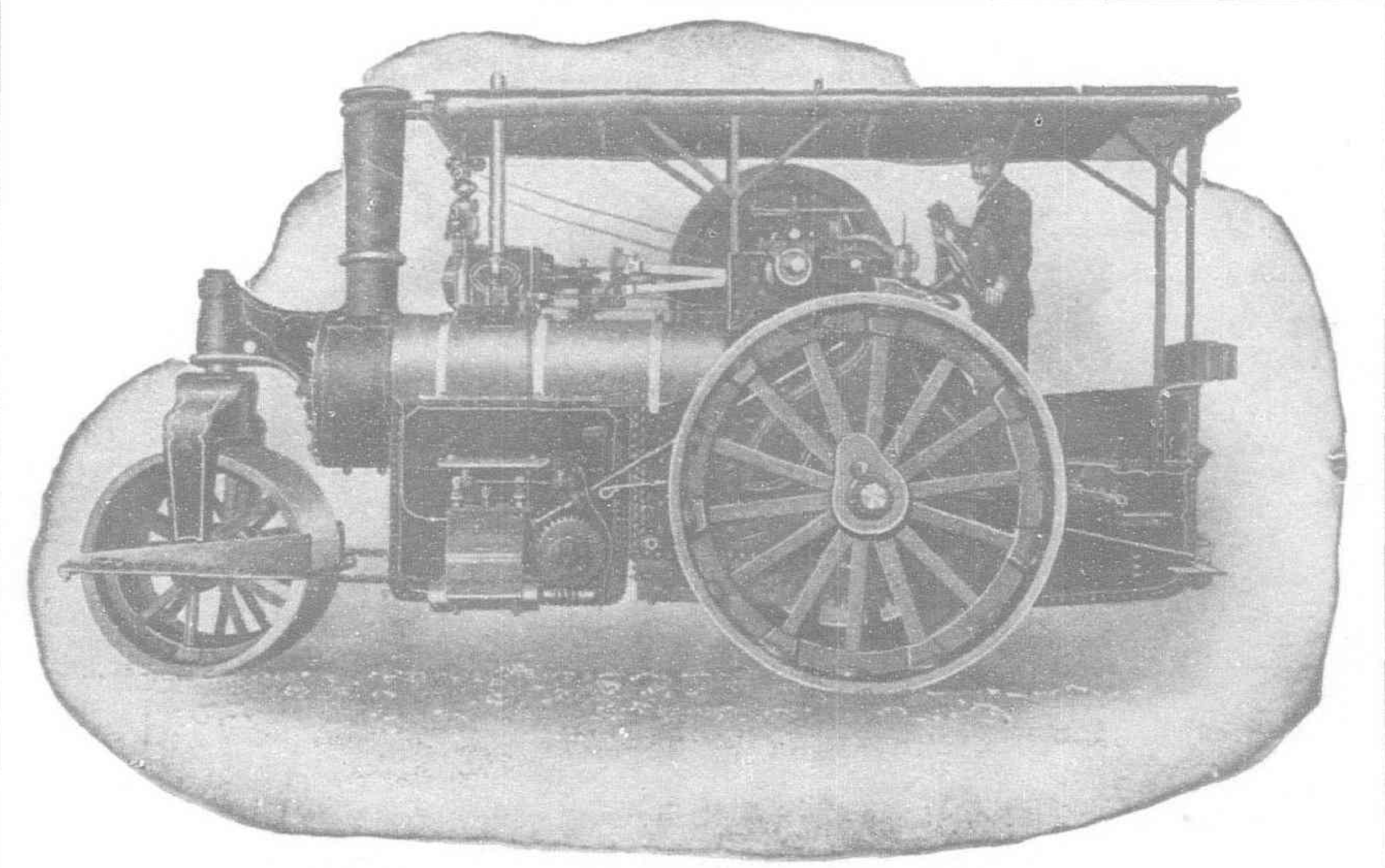
Road Building and Maintaining Machinery---Rice, Threshing, Hulling and Polishing Machinery—Elevators, screens and bins—Rock crushers of all sizes—Tramways and cars—Street sweepers—Street sprinklers—Stone wagons—Garbage carts—Dump cars, track iron, switches and turning tables—Wagon loader, road builder and ditching machine—Wheeled scraper—Tile ditcher and sewer builder—Well Machinery—Hand sweepers, for streets—Hand garbage carts—Wind Mills—Spring Drays—Steam Pumps—Farm Carts—Railroad Carts—Carabao Cart Wheels.—All sizes locomotives for plantations, custom houses, public works and large locomotives for railroads—Rock drills—Coal Cutters—Stone channeling machine—Complete mining, tunneling and quarrying plants.—Forges—Blowers—Drills—All kinds of tools—Derricks of all kinds for harbor improvements, custom house docks, buildings, railway and bridge construction.



TEAM ROLLERS—2½—5—7—10—12—18 TONS

C. E. HELVIE, MANAGER

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YOKOHAMA SHARE QUOTATIONS

COURTESY A. C. HUTTON POTTS, SHARE AND GENERAL BROKER, YOKOHAMA, DECEMBER, 1905.

STOCKS.	CAPITAL.	NO. OF SHARES.	ISSUE VALUE.	AMOUNT PAID UP.	RESERVE FUND.	AT WORKING ACCOUNT OR CARRIED FORWARD.	DATE.	LAST DIVIDEND.	FOR TERM.	CLOSING QUOTATION.
	Y.		Y.	Y.						
Brett & Co., Limited	28,000	2800	10	10			30/6/03	6%	for 1 year	7 Nominal.
Club Hotel, Limited	185,000	1850	100	100			31/3/04	7%	,, 1 year	53 Buyers.
Grand Hotel, Limited	250,000	2500	100	100		Y.2,608.34	30/6/05	6%	,, ½ year	225 Buyers.
Helm Bros., Limited	186,000	3720	50	50		Y.8,349.06	31/12/04	17½%	,, 1 year	77½ Sales.
Langfeldt & Co., Limited	150,000	1500	100	100		Dr.30,174.81	30/6/05		,, ½ year	35 Buyers.
C. Nickel & Co., Limited	125,000	5000	25	25		10,572.91	31/10/04	16%	,, 1 year	32½ Sellers.
Japan Brewery Company, Limited	450,000	9000	50	50	170,000	4,781.87	31/12/04		,, 1 year	130 Sellers.
Yokohama Engine and Iron Works	130,000	2600	50	50	20,000	Y.5,935.35	31/5/05	20%	,, 1 year	120 Sellers.
Hirano Mineral Water Co., Ltd	125,000	5000	25	25				1st year		25 Sellers.
Oriental Hotel, Ltd., Old Ordinary		1490	50	50			31/8/05	12%	,, 1 year	75 Nominal
,, ,, New ,,		1510	50	25						
,, ,, Old Preference	251,000	750	50	50	60,542.50			8%	,, 1 year	63 Sales.
,, ,, New ,,		1250	50	25						
,, ,, Founders	G	80	12½	12½				Y.37	,, 1 year	500 Sales.
Oriental Consolidated Mining Co., Ltd	$5,000,000	500,000	G.$10	G. $10	none	G. $672,093	31/12/04	G. 50 cts.	,, 1905	G. $20 Sellers.
Raub Australian Gold Mining Co., Ltd.	£200,000	150,000 50,000	£1 £1	18/10 £1	£4,873	*Dr.* £8,745	31/3/05	48 cts.	,, 1901	$5.10 Sales.
*New issue authorized	Y.175,000									30 Buyers

DEBENTURE LOANS.	AMOUNT OF LOAN.	FACE VALUE OF DEBENTURES.	RATE OF INTEREST.	INTEREST PAYABLE.	CLOSING QUOTATION.
Japan Brewery Company, Limited	200,000.00	100.00	7%	1 April and 1 October.	108 Sales.
Brett and Company, Limited	11,500.00	100.00	7%	1 June and 1 Dec.	95 Sellers.
Yokohama United Club	250,000.00	100.00	7%	30 June and 31 Dec.	108 Sales.
C. Nickel and Company, Limited	50,000.00	100.00	8%	1 May and 1 Nov.	110 Sellers.

Telegraphic Address:
"GRAND"

Telephone (Long Distance)
No. 85.

The Grand Hotel, Limited

18, 19 and 20 The Bund, Yokohama, Japan

COMMANDS AN UNBROKEN VIEW OF THE HARBOUR AND TOKYO BAY FROM BROAD TERRACES WHICH AFFORD A PLEASANT LOUNGE

Electrically Lighted Throughout

Steam Heat and Open Fires

Rooms Single, or En Suite with Private Bath, etc.

RATES: FROM 6 YEN UPWARD

NO EXTRAS

Wines and Cuisine (French Chef) the Best the Market Affords. The Hotel Band Plays Each Evening. A Steam Launch Under Competent Supervision Attends All Arriving and Departing Steamers, and the Porter Attends to All Customs Formalities in Respect to Baggage.

THE GRAND HOTEL CATERS TO FIRST-CLASS TRAVEL AND IS THE BEST KNOWN HOTEL IN THE EAST

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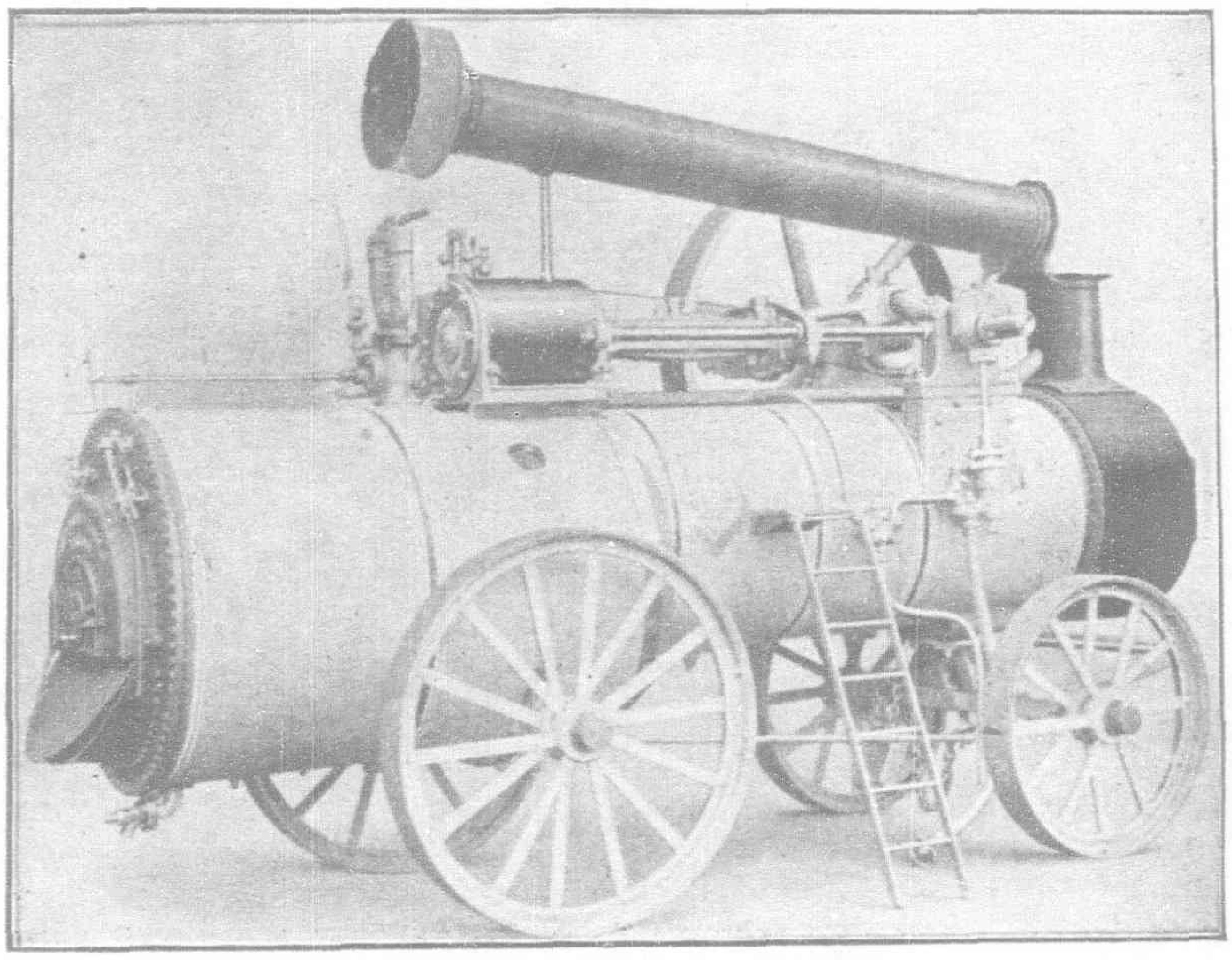
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PERRY'S SAFES
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WHITE BROS. CEMENT
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"International" Kerosene Engines
1½ to 20 H. P.
For Stationary or Marine Use
Kept in Stock

Frazer & Co.

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MINING ENGINEER,
TIENTSIN, NORTH CHINA

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REPORTS ON MINES AND MINERAL CLAIMS. GOLD MINES A SPECIALTY. EXPLORATION, SURVEYS, ETC.

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DENNEY, TIENTSIN

Codes: Bedford McNeil,
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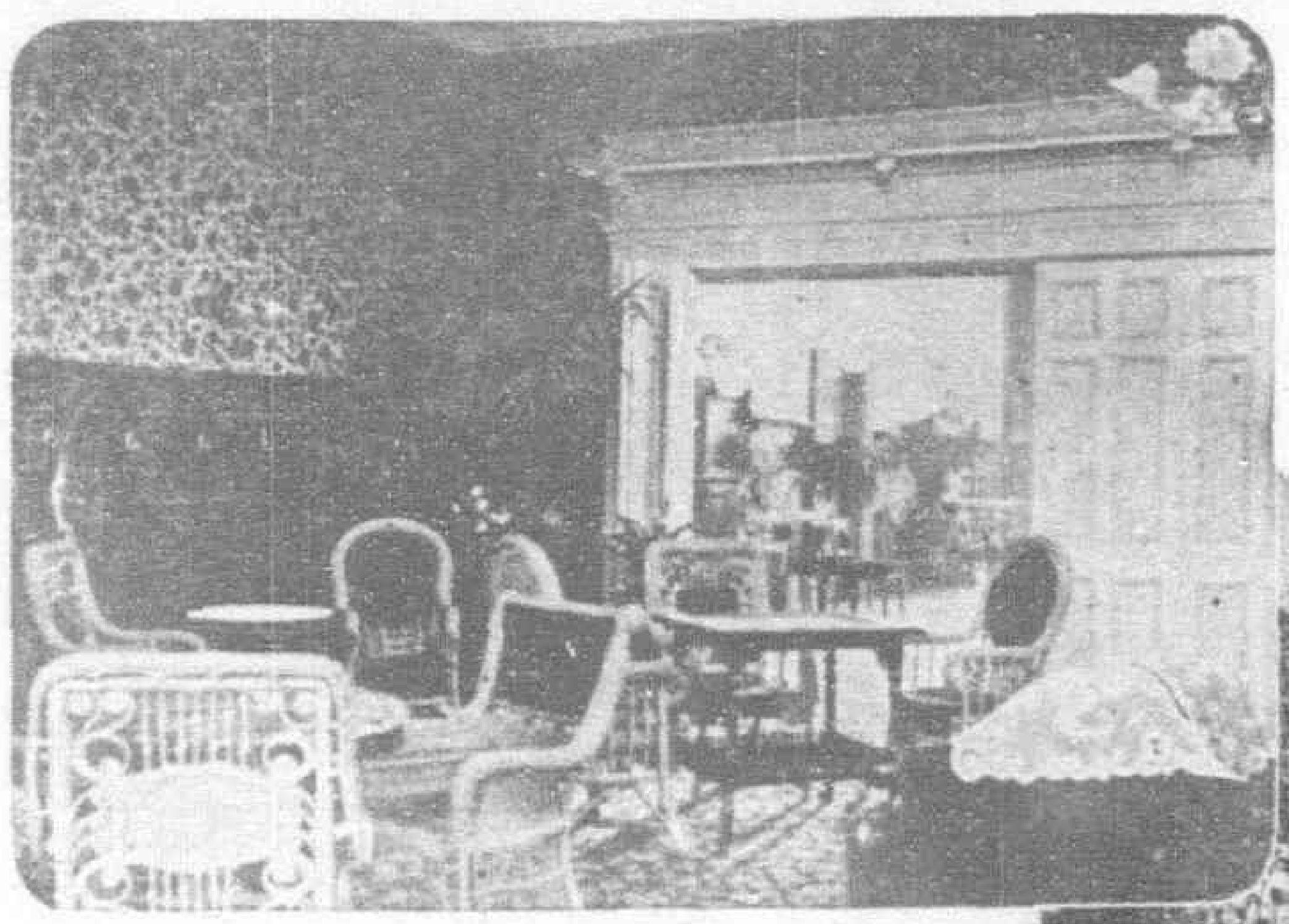

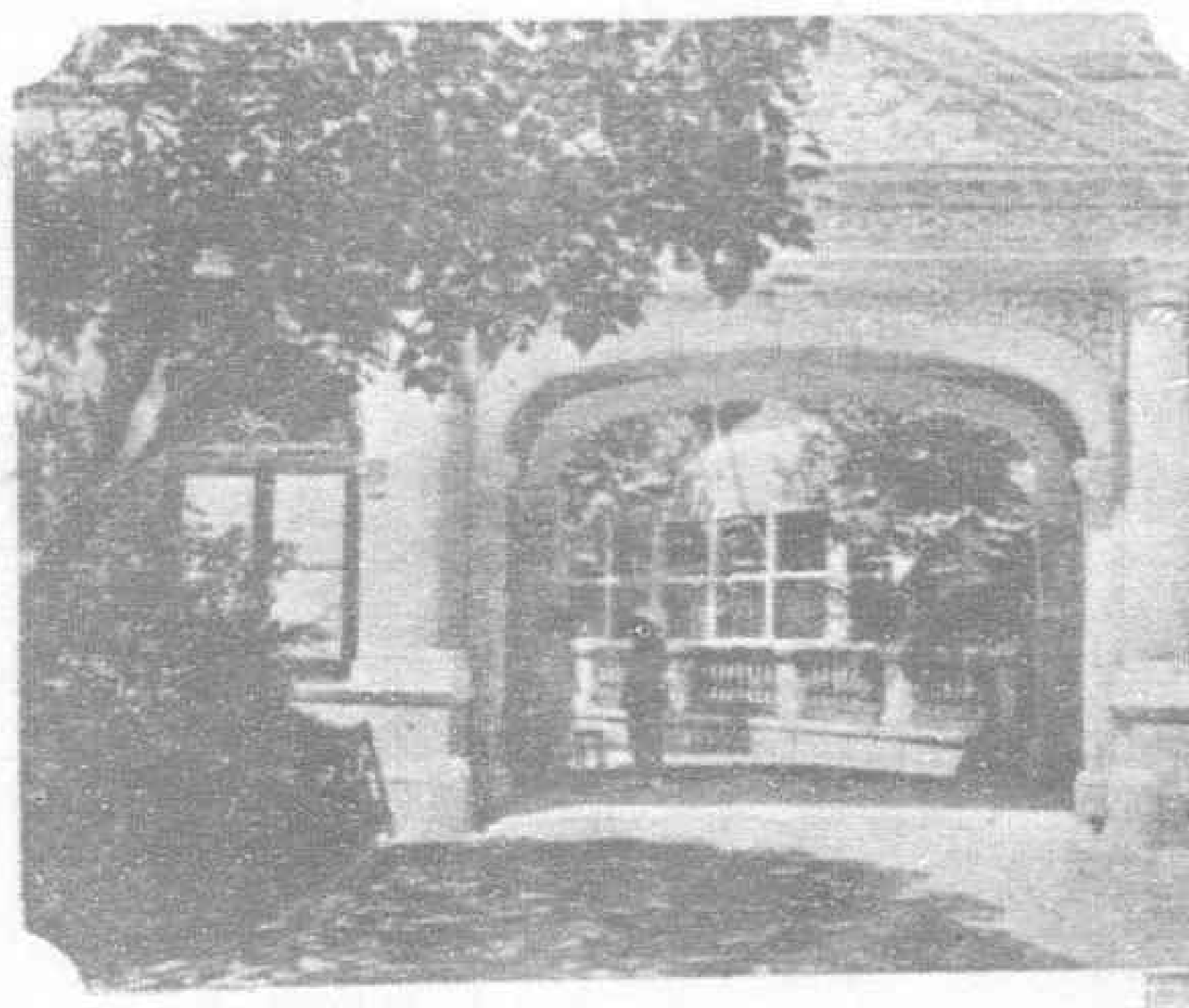

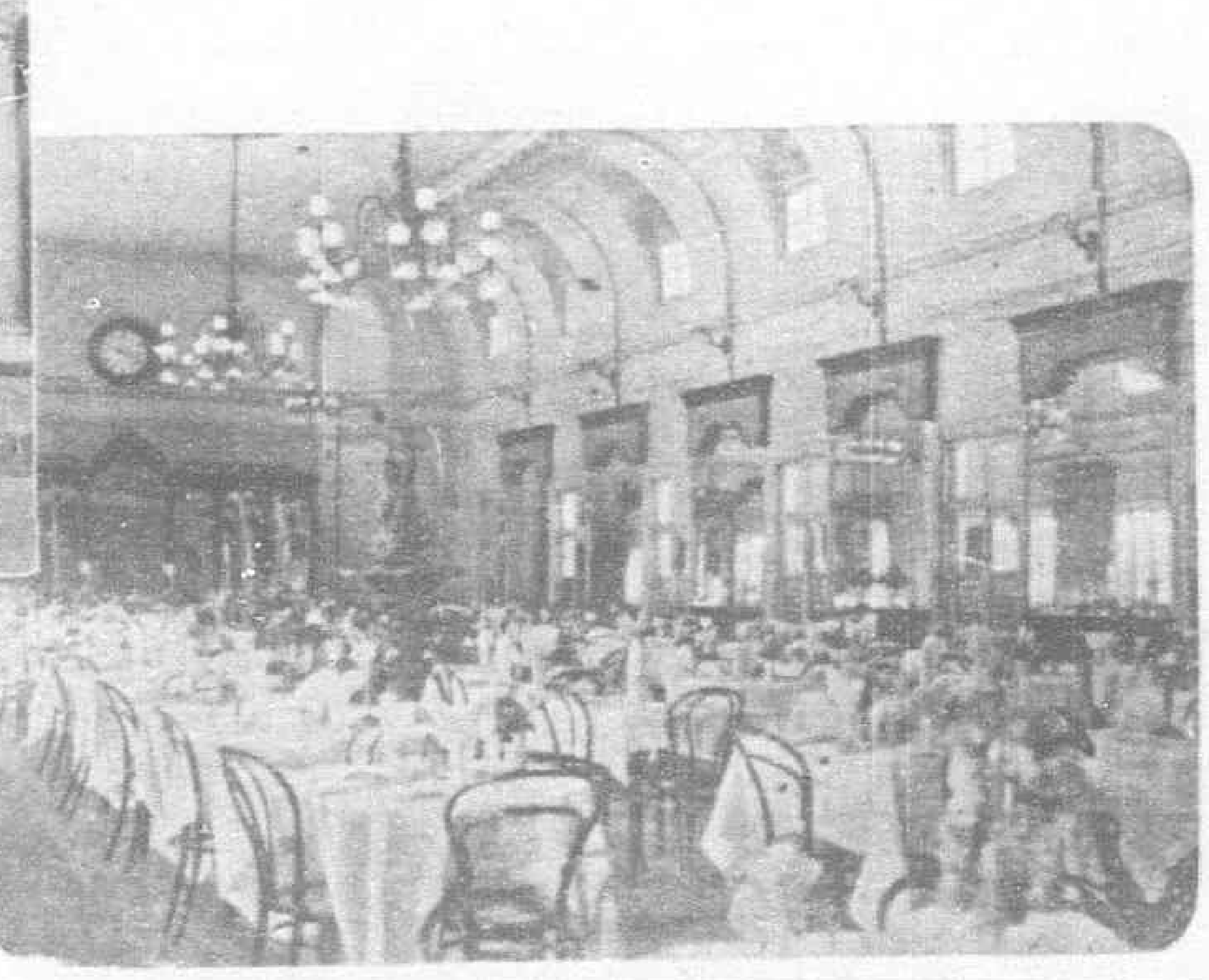

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SHANGHAI, CHINA

CABLE ADDRESS: "ASTOR" SHANGHAI

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Two Hundred Bedrooms with Hot and Cold Baths Attached to Each Room.

Cuisine Unexcelled; Service and Attention Perfect.

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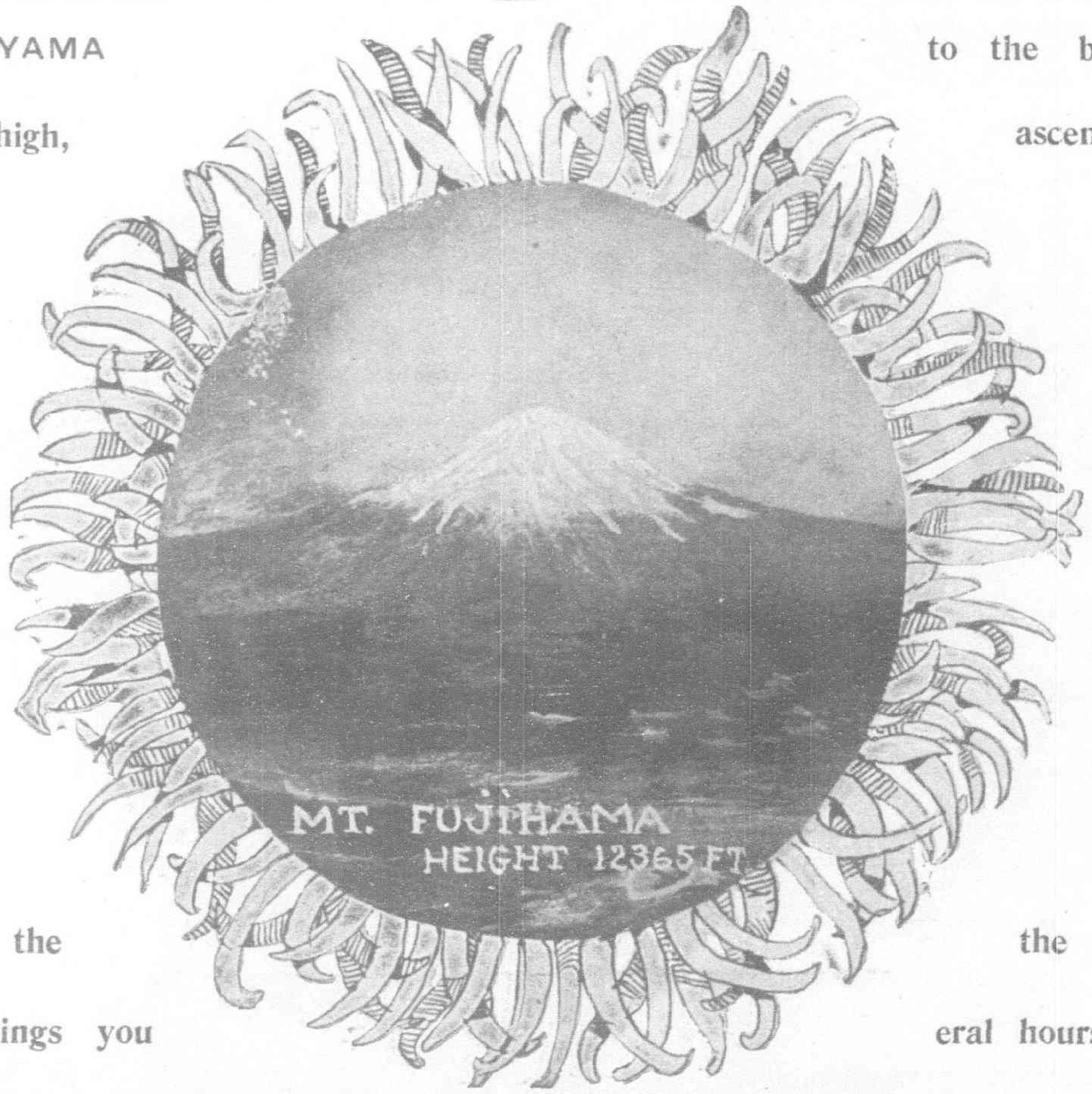

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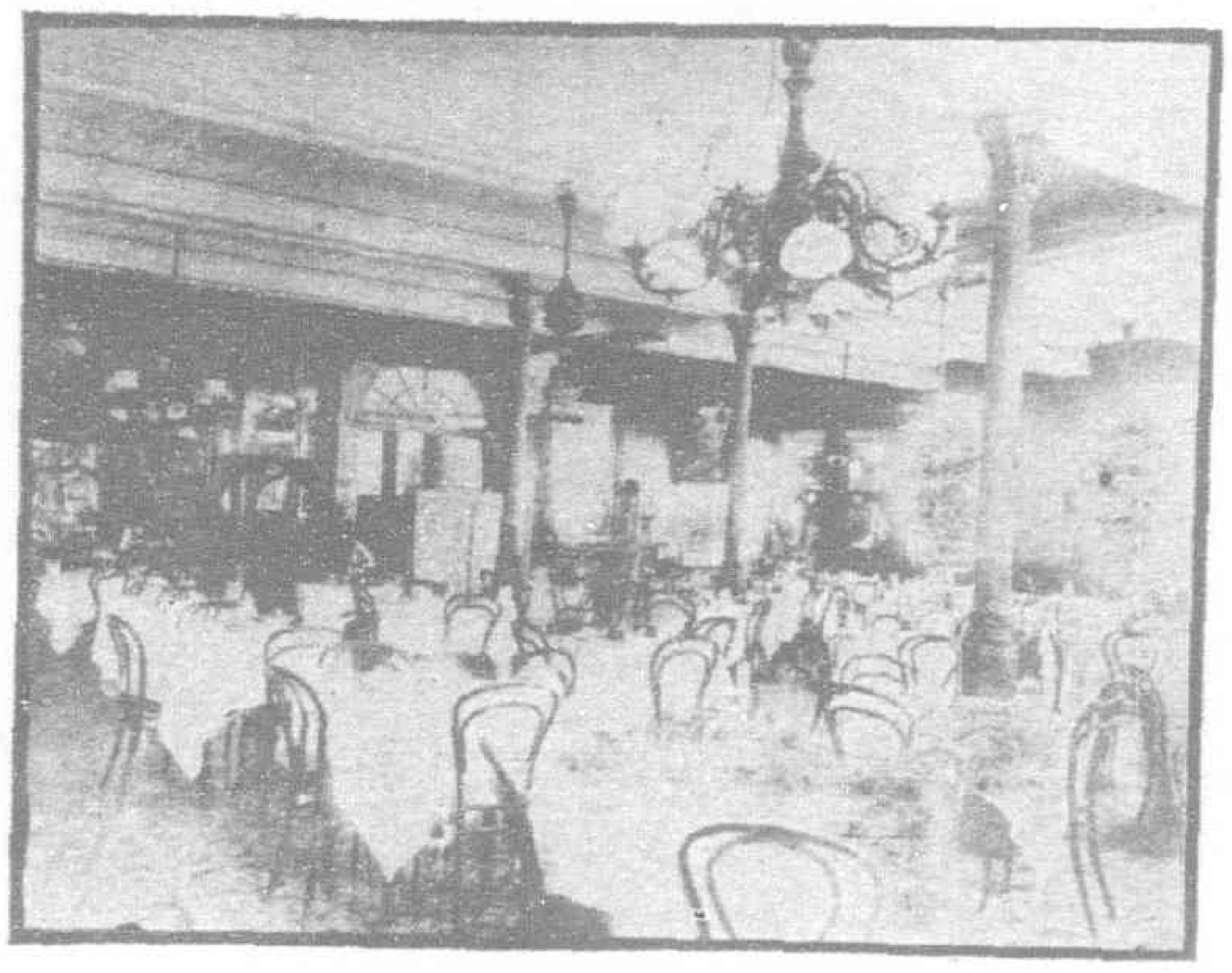

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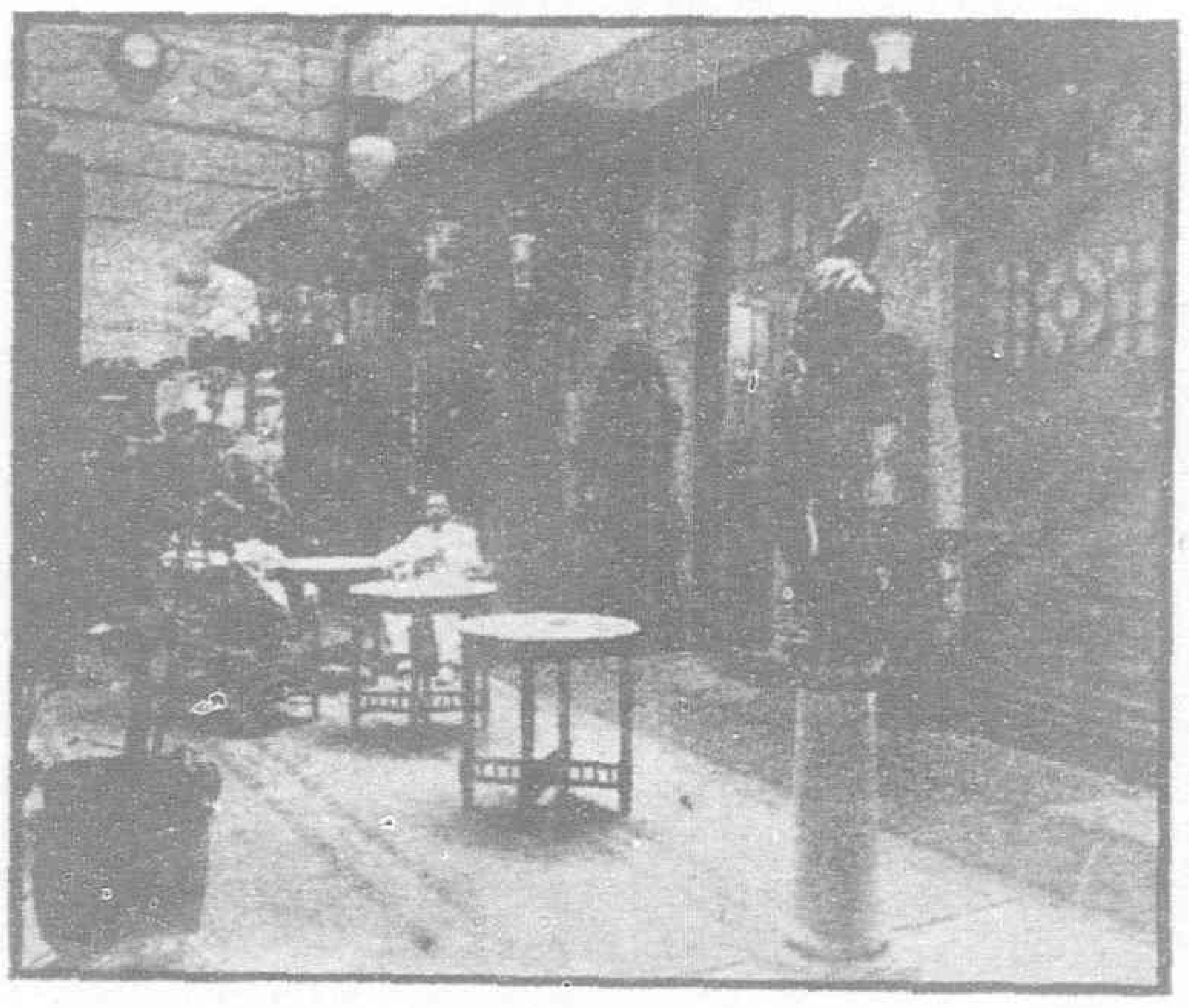

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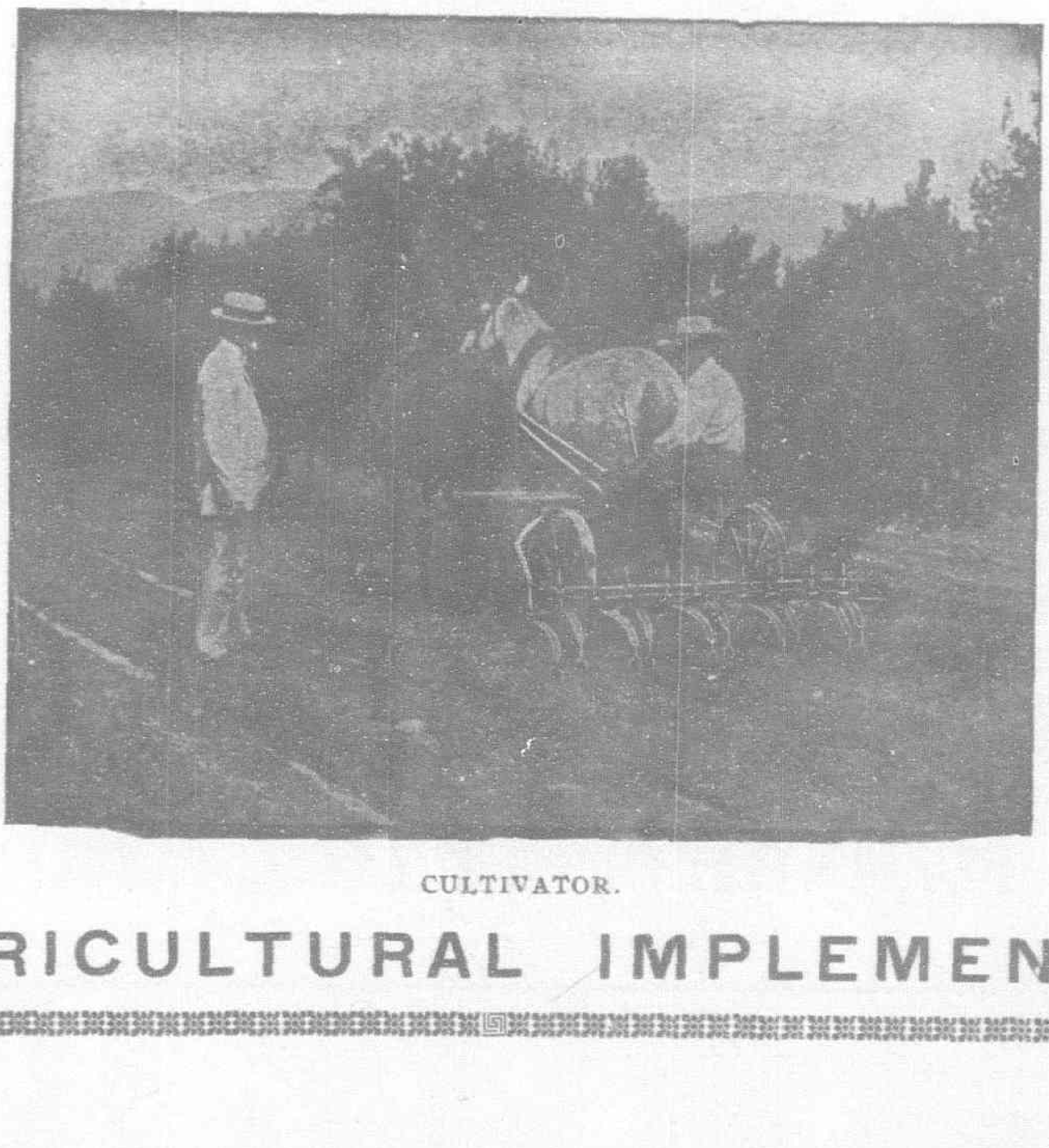

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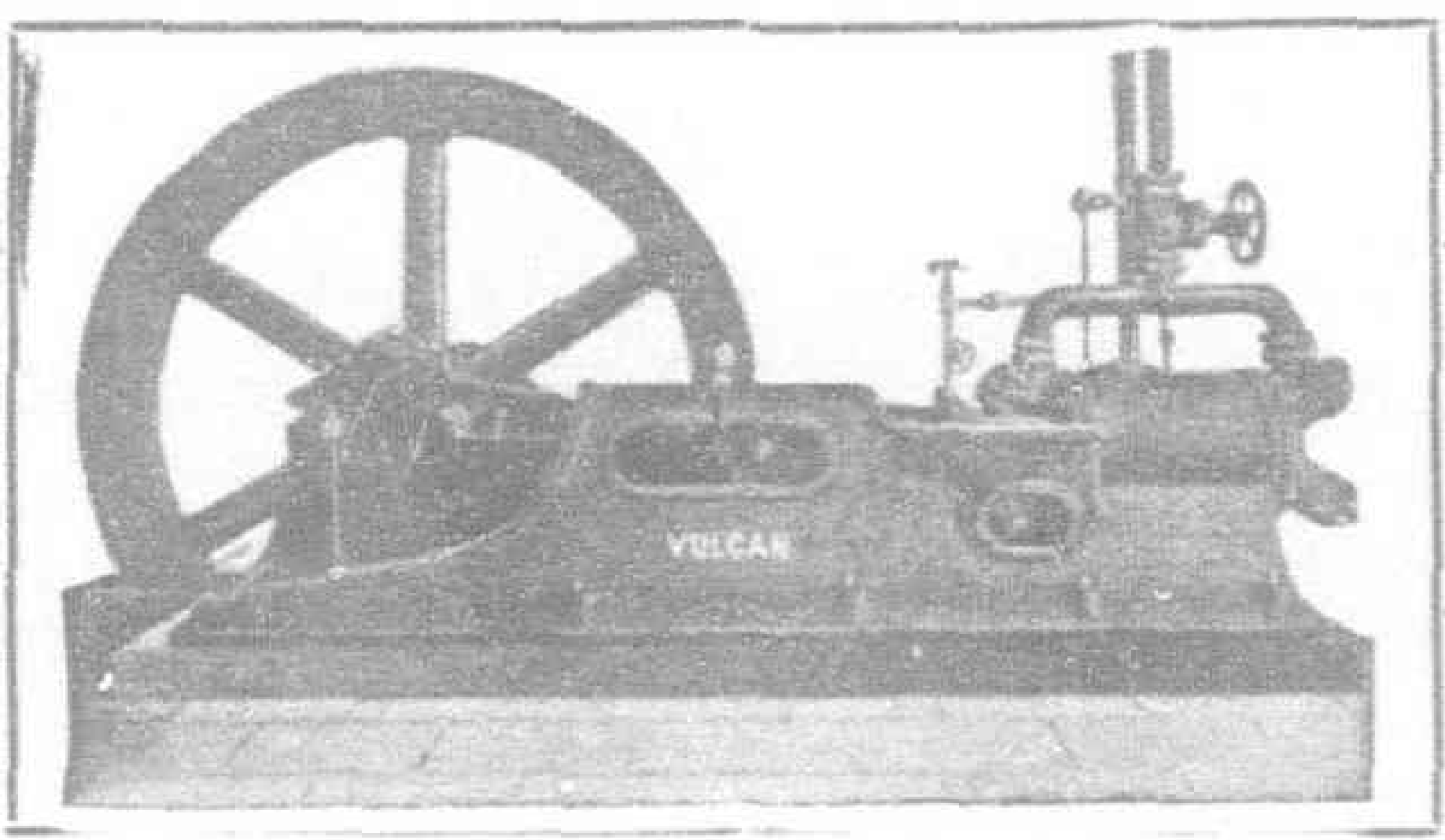

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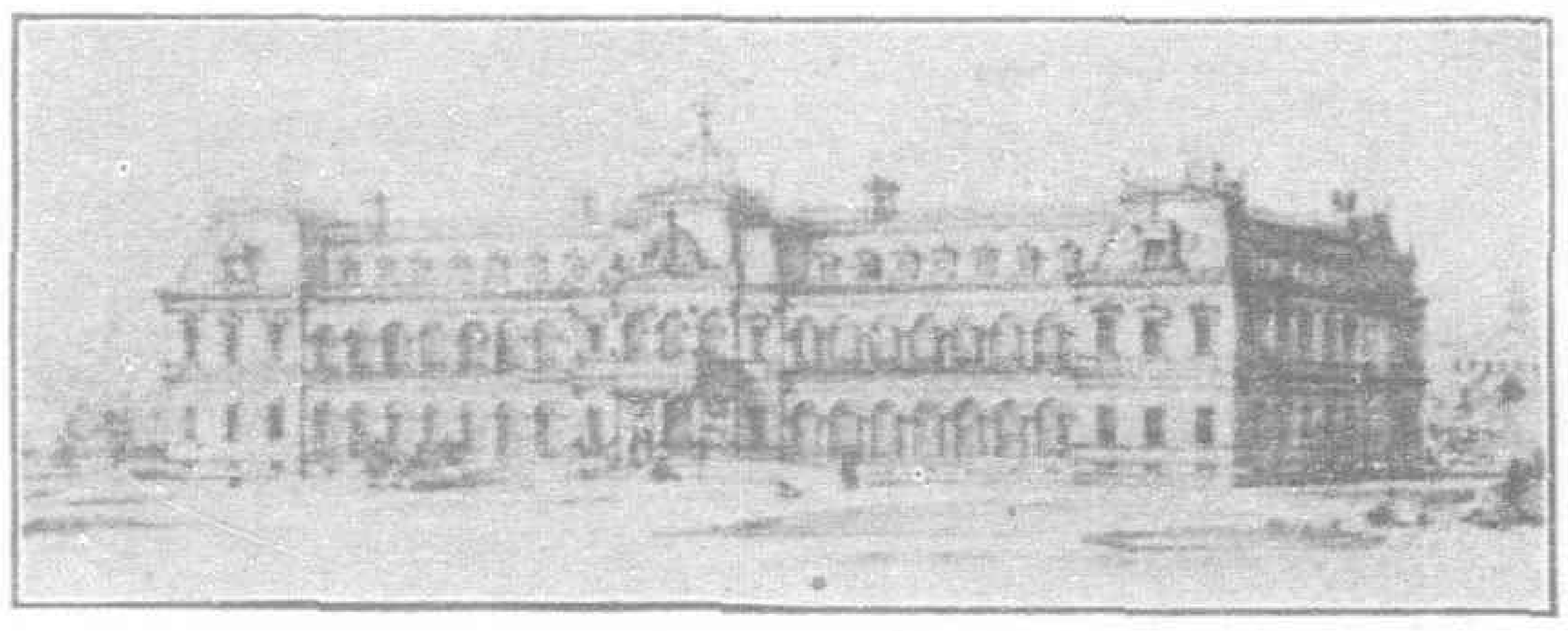

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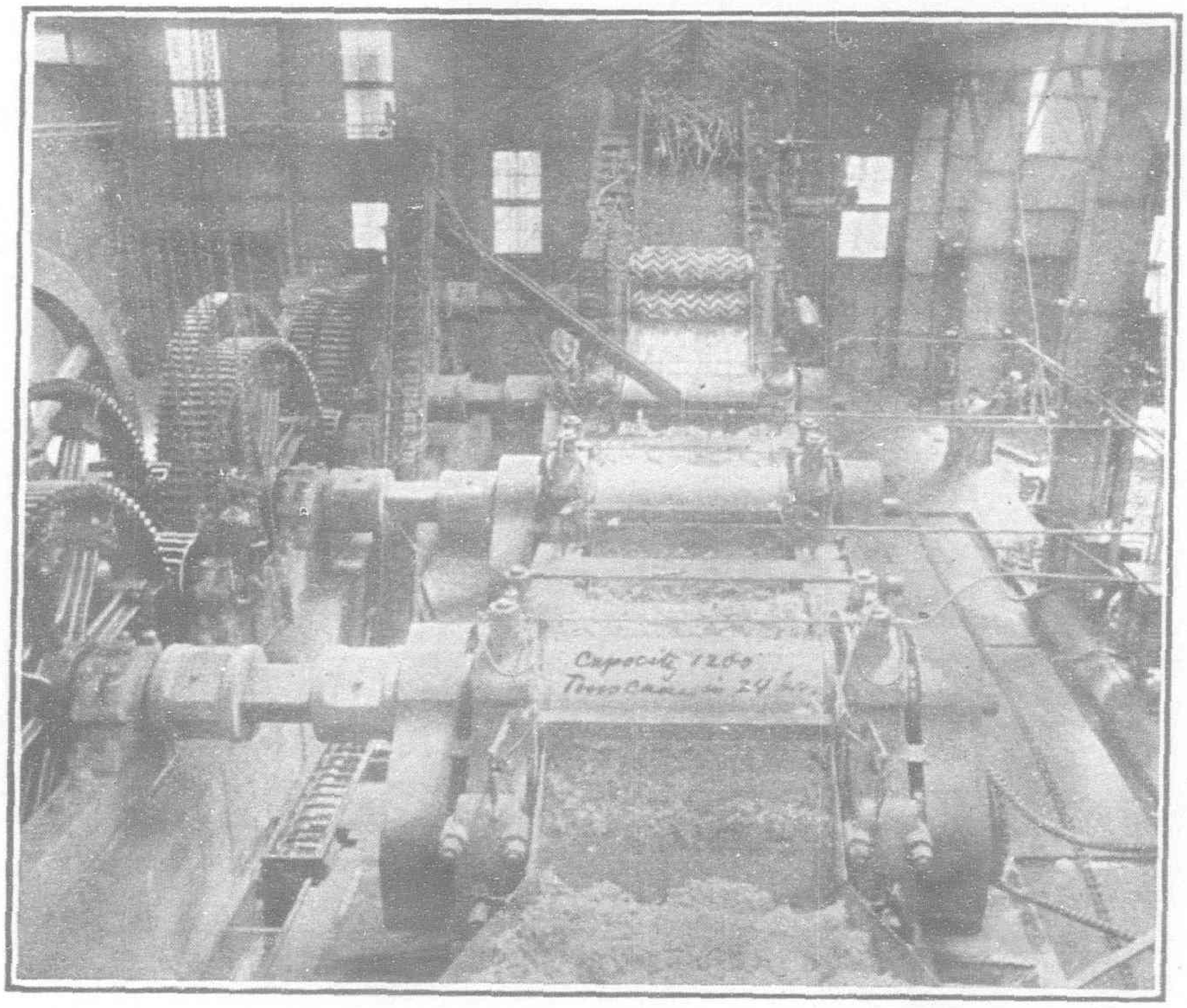

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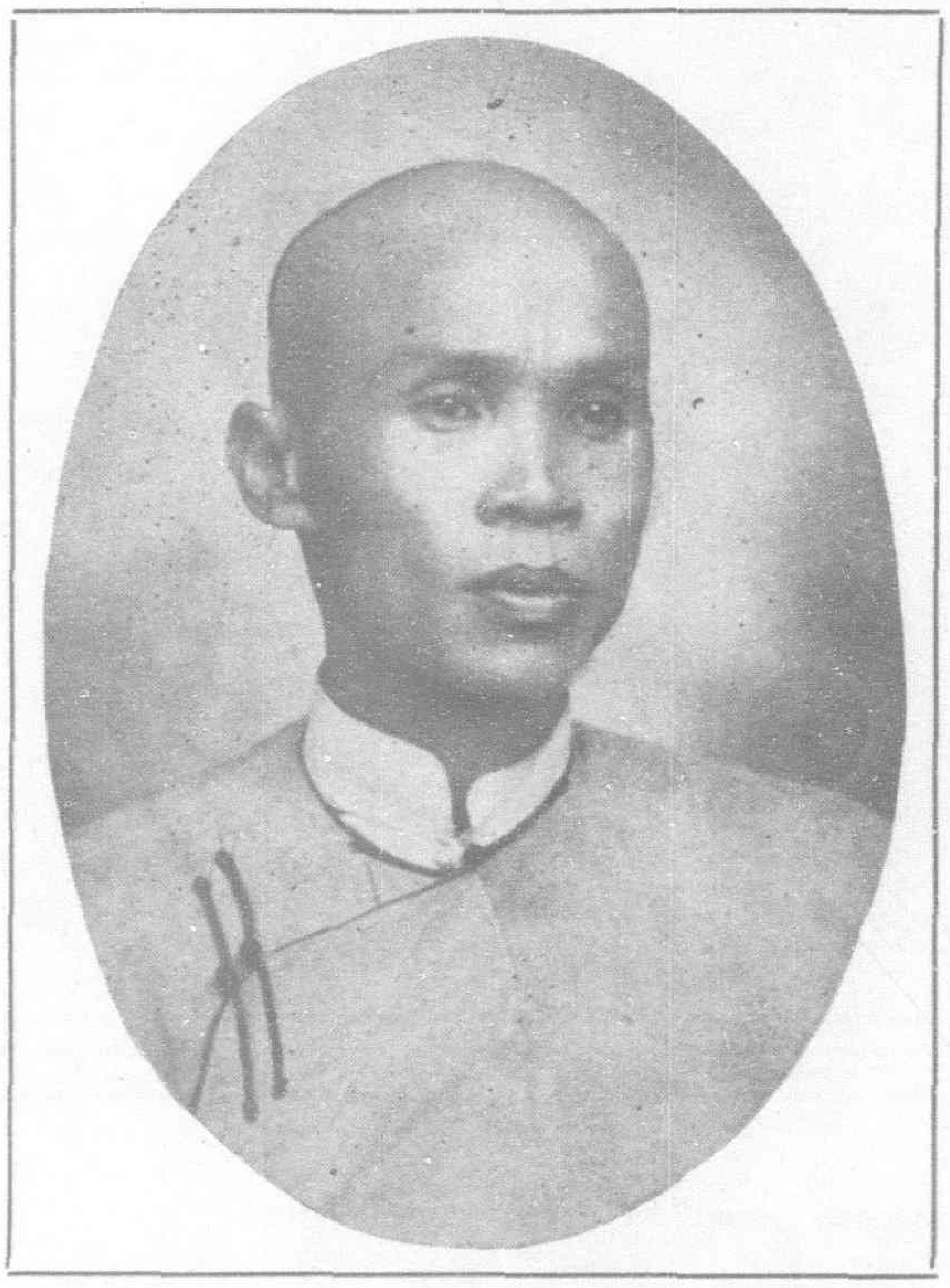

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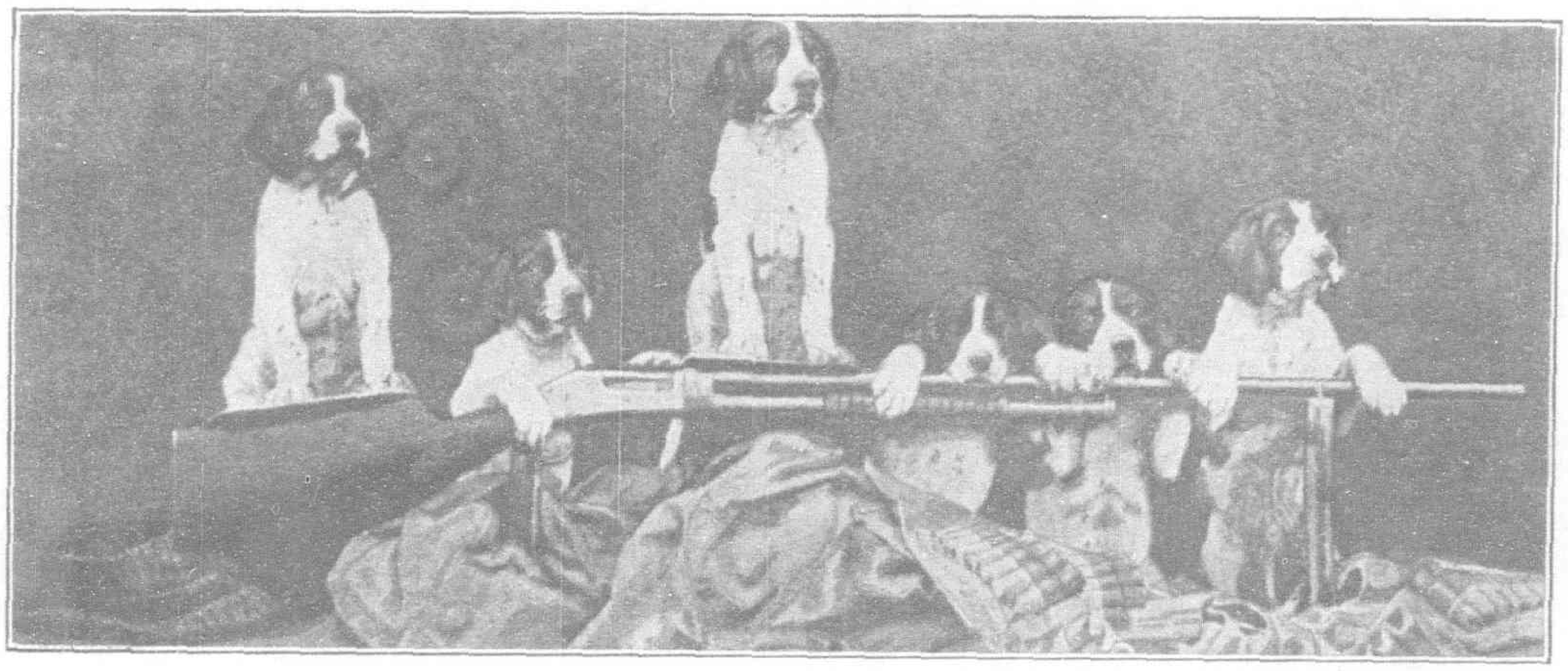

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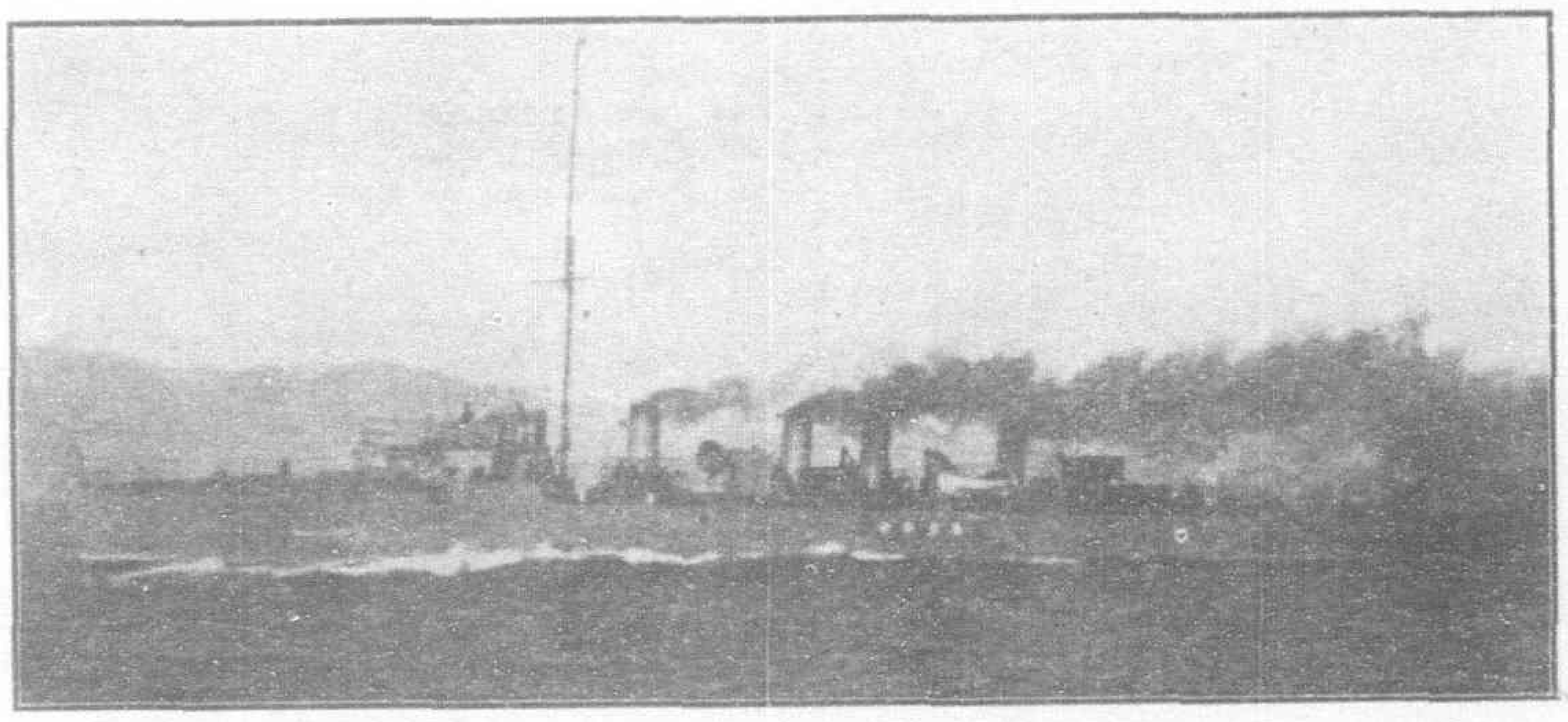

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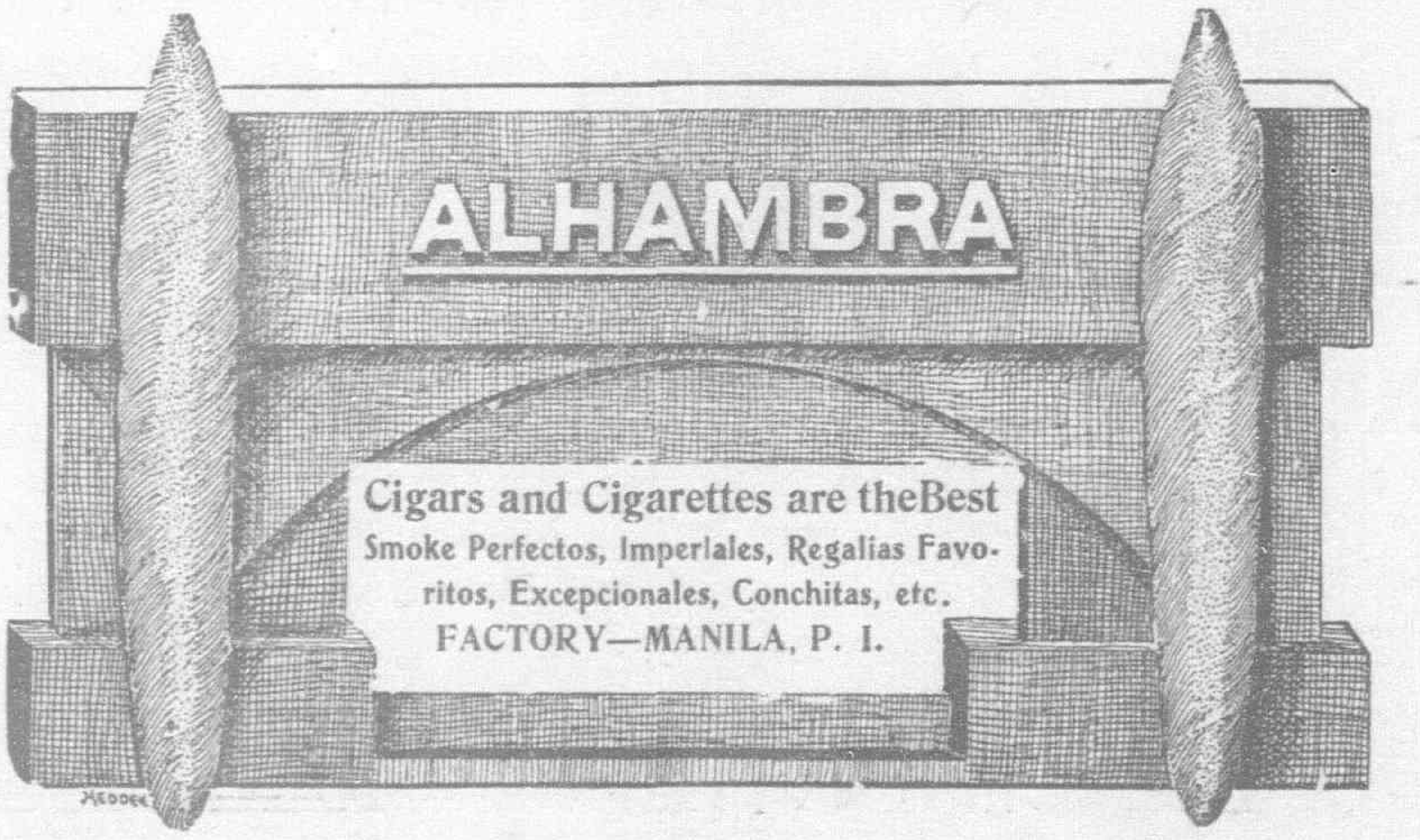
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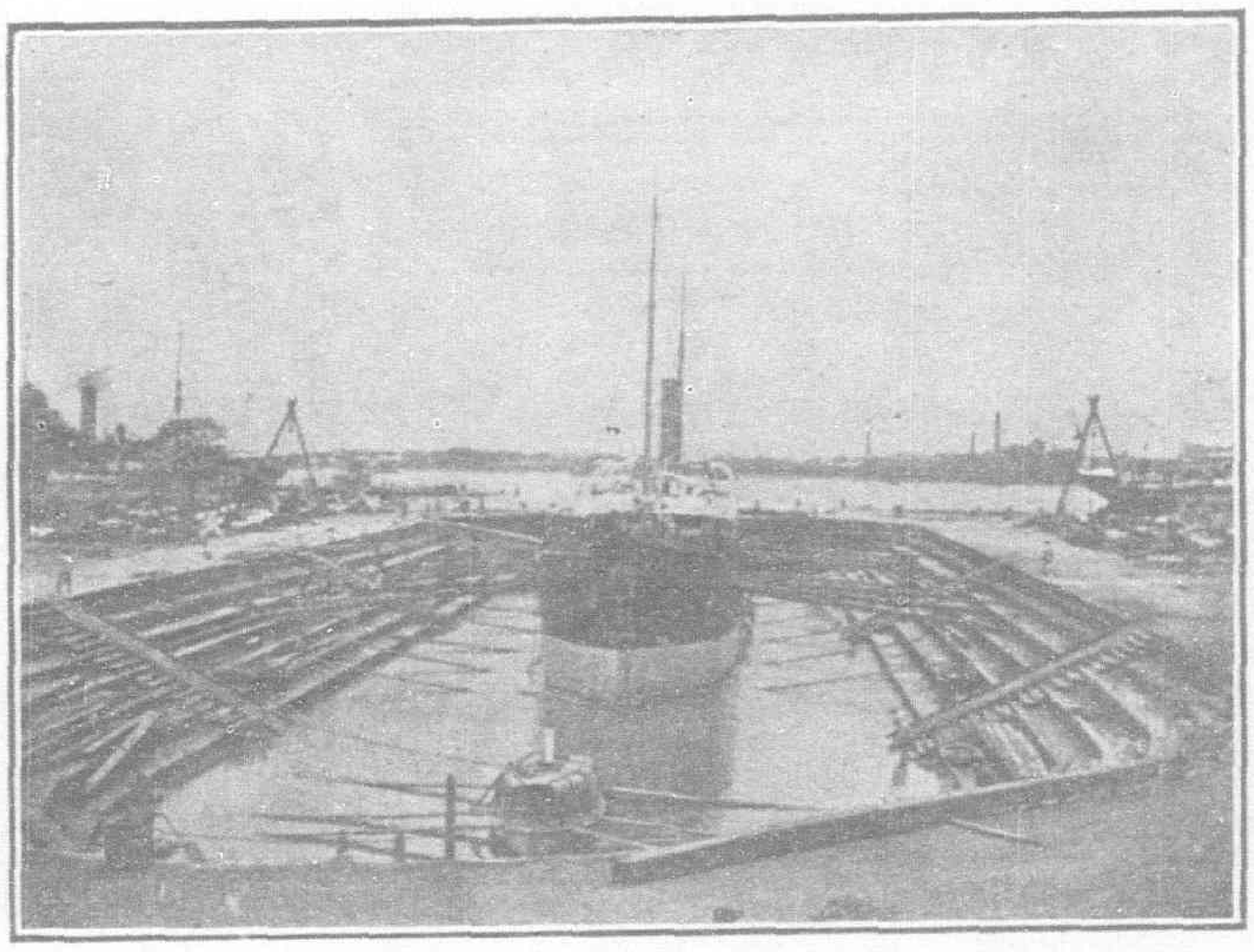

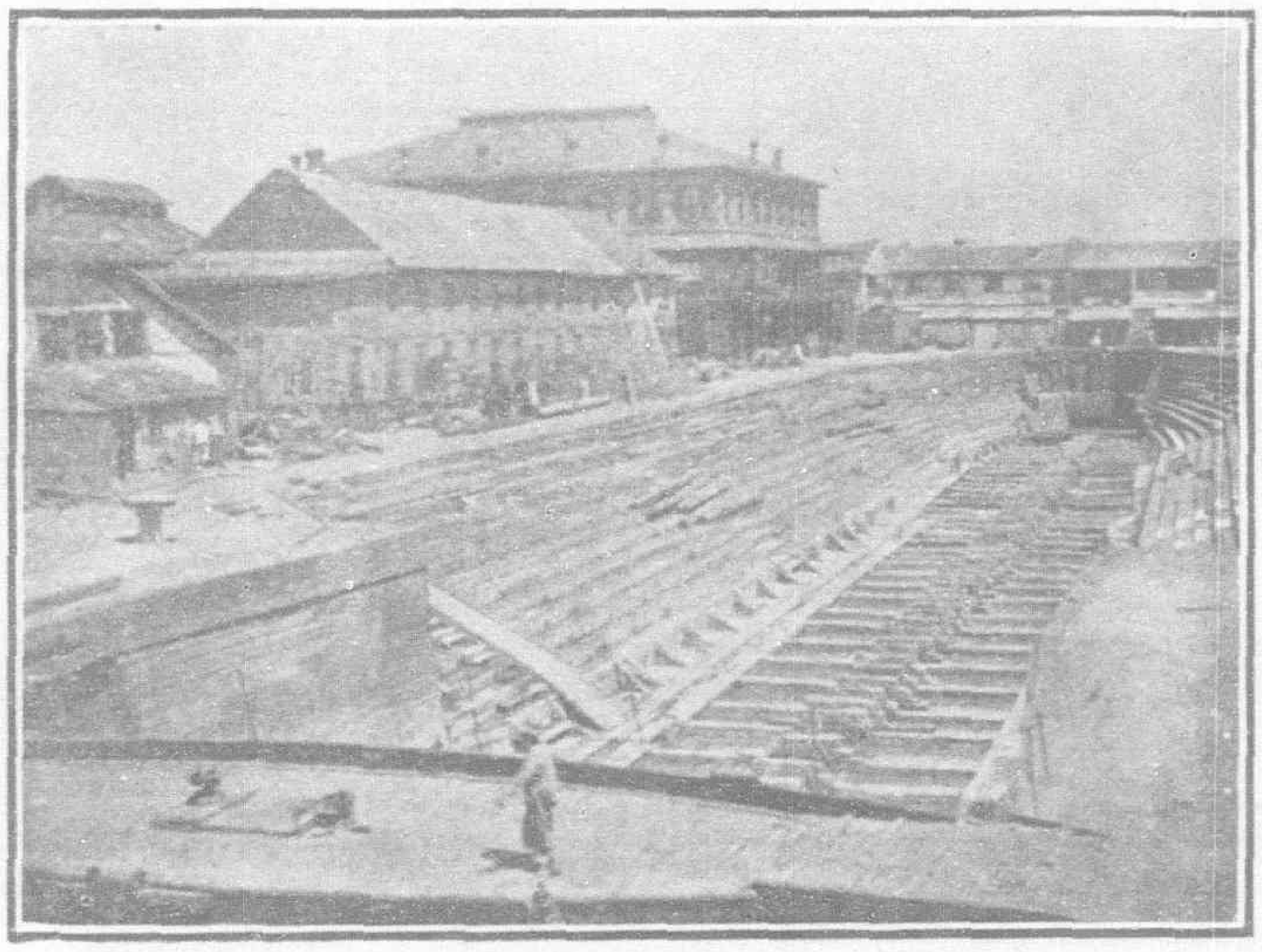

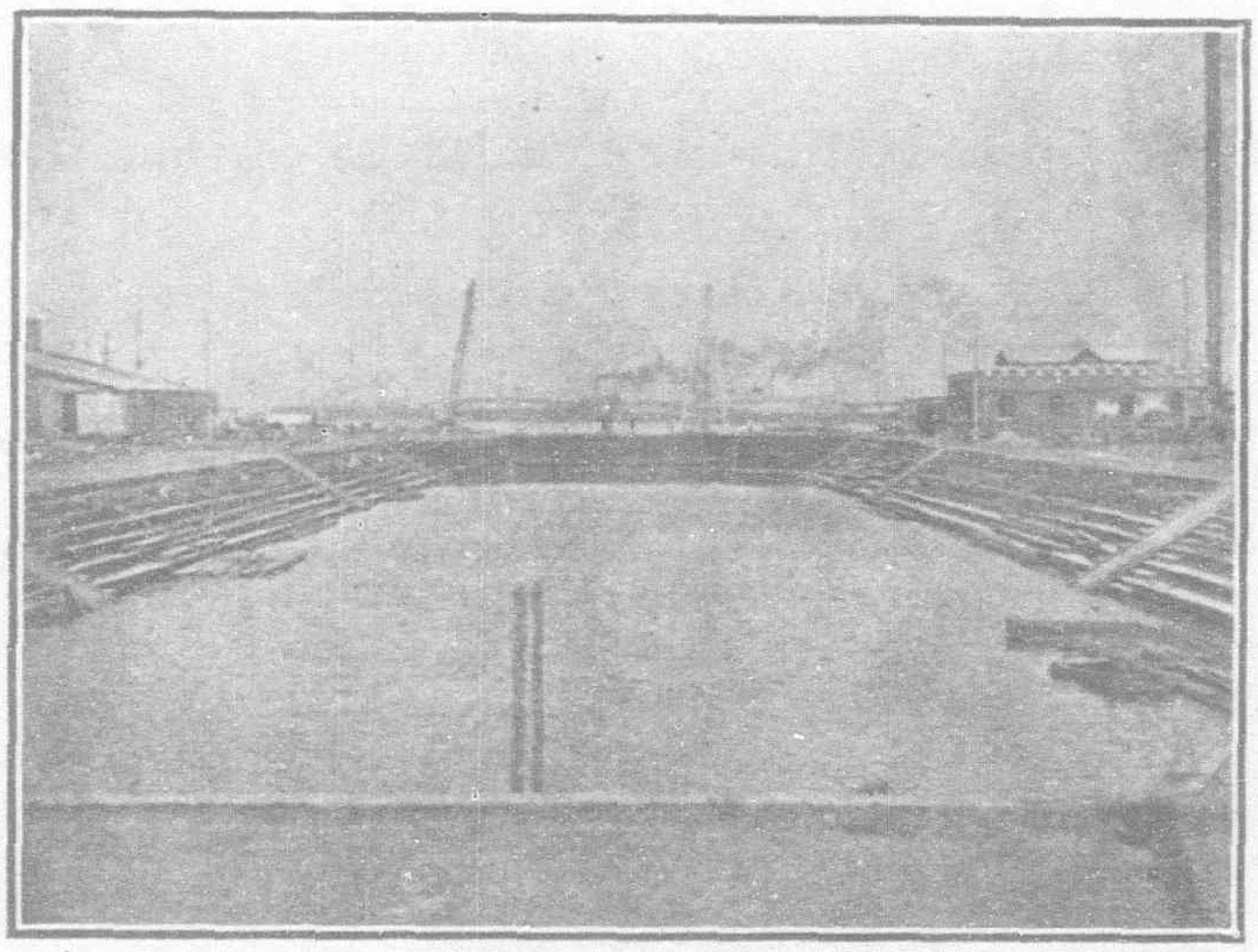

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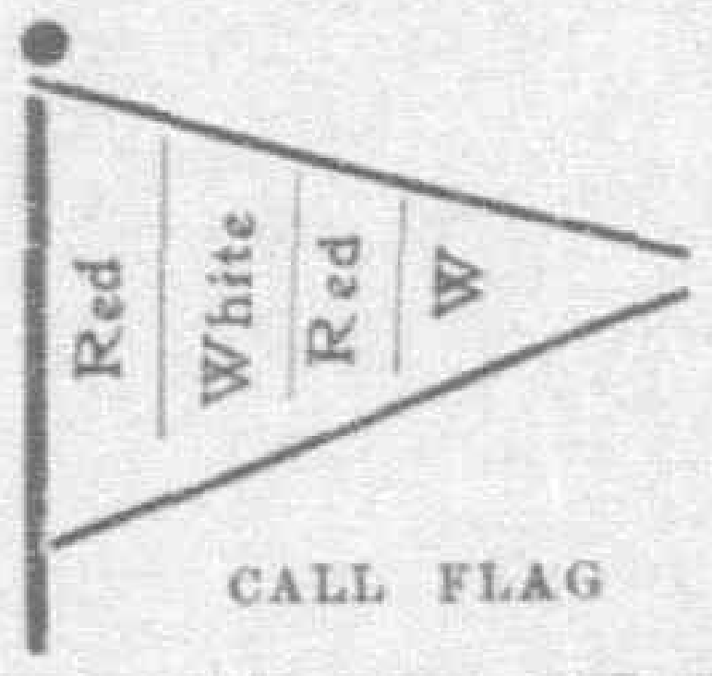

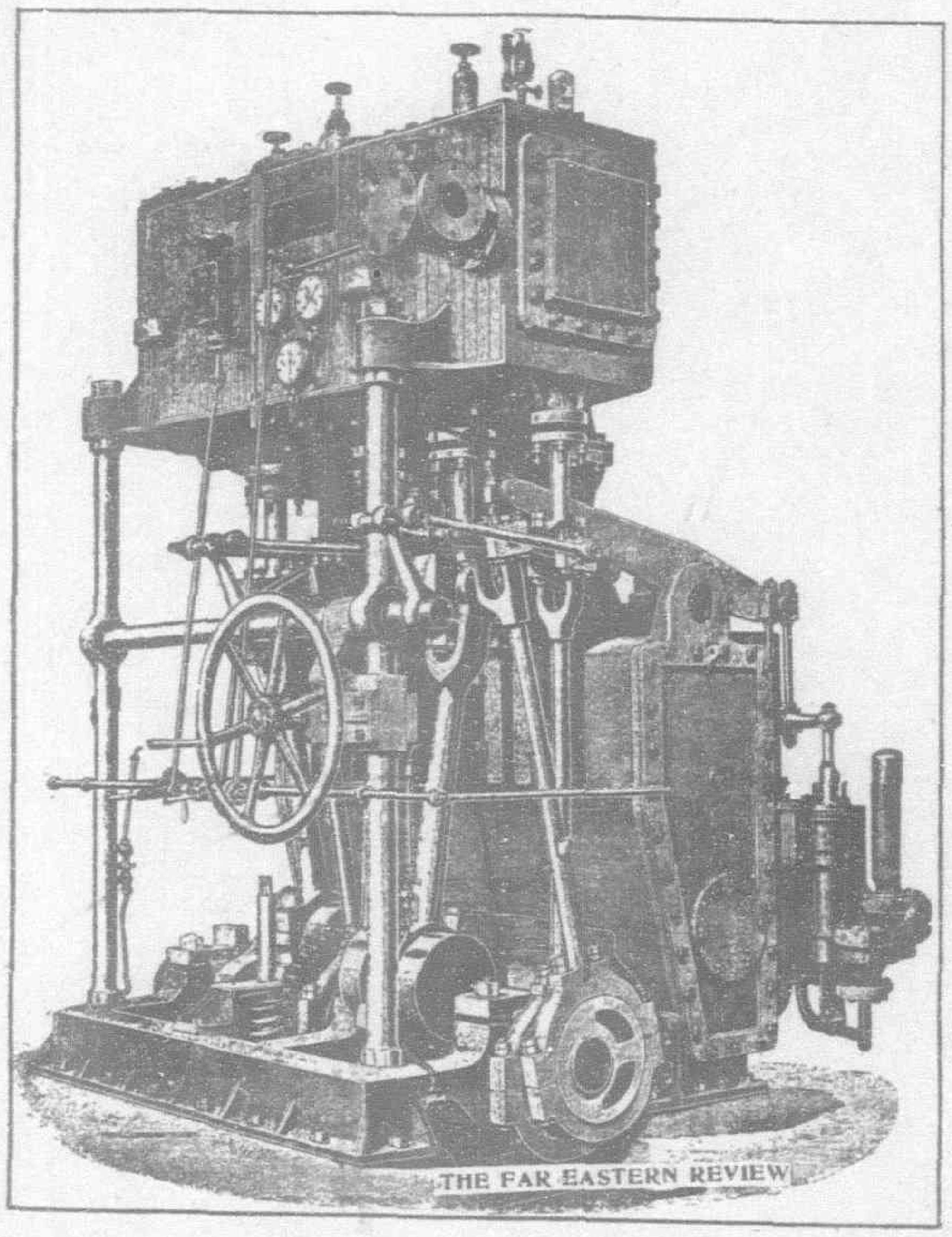

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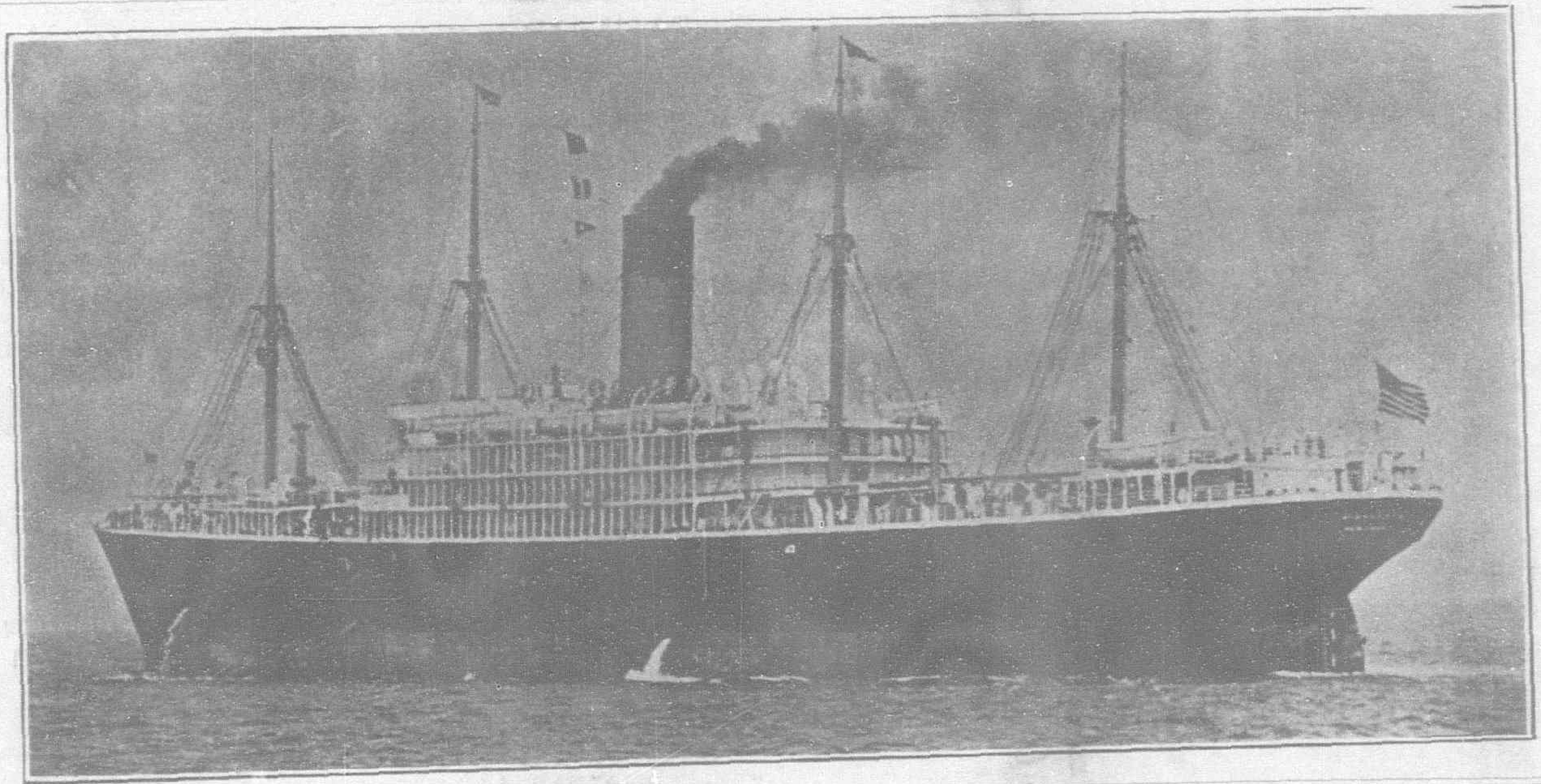

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